TECH SCAN

GREEN HYDROGEN TECHNOLOGY

BAZAAR®

WHERE MIND MEETS MARKET

Green hydrogen technology is incredibly important for creating sustainable energy solutions and fighting climate change. It is a clean and renewable energy source made by splitting water through a process called electrolysis, using renewable sources like solar and wind power. This technology is crucial because it offers a way to produce energy without adding more carbon dioxide to the atmosphere, unlike traditional fossil fuels. By using green hydrogen, we can cut down on greenhouse gas emissions and protect the environment. Additionally, it helps ensure energy security by reducing our dependence on finite fossil fuels.

In India, the government has recognized the potential of green hydrogen and initiated various policies and schemes to promote its adoption. The National Hydrogen Energy Mission aims to establish India as a global leader in green hydrogen production and utilization. Moreover, collaborations between the government, industry, and research institutions are fostering innovation and infrastructure development in this field. Indian trends indicate a growing interest in green hydrogen projects, with investments pouring into research, development, and large-scale production facilities.

Patents play a crucial role in advancing green hydrogen technology by protecting intellectual property and promoting innovation. The filing trend in this specific field reflects a surge in patent applications related to electrolysis techniques, hydrogen production methods, and hydrogen fuel cells. Companies and research organizations are actively filing patents to secure their innovations and contribute to the growth of the green hydrogen sector. This trend underscores the global momentum towards sustainable energy solutions and the increasing focus on green hydrogen as an essential element of the clean energy transition.

TIMELINE


1784
Jacques Charles built the first hydrogen air balloon
1823
Johann Wolfgang Dobereiner invented the first hydrogen lighter to light a cigar
1839
Sir William Robert Grove developed the first hydrogen-powered fuel cell
1965
Hydrogen fuel cells for the Gemini and Apollo space missions
1990
The first solar-powered hydrogen production plant was launched in southern Germany
2004
US Department of Energy launched the Hydrogen Fuel Initiative (HFI)
2008
Honda FCX, the first hydrogen fuel cell car launched for commercialization
2016
The first hydrogen fuel cell Mirai passenger car was launched by Toyota
2018
Germany rolls out the world's first hydrogen fuel cell train
2019
ALAKA'I technologies launched world's first hydrogen fuel cell powered air mobility system
2020
The world's largest green hydrogen production from renewable energy in Japan
2021
The world's first liquid hydrogen-powered boat, the MF Hydra, was launched in Norway
2022
First liquefied hydrogen shipment from Australia to Japan

PATENTABLE ASPECTS

ELECTROLYSER TECHNOLOGY

- Electrolyte formulations
- Electrode designs (anode and cathode)
- Membrane materials and structures
- Catalyst compositions

STORAGE AND TRANSPORTATION SYSTEMS

- Hydrogen storage tanks and vessels
- Compression and liquefaction technologies
- Pipelines and distribution networks
- Transportation methods

WATER ELECTROLYSIS OPTIMIZATION

- Efficiency-enhancing techniques
- Electrolysis reactor configurations
- Heat recovery and utilization systems
- Advanced control algorithms

CARBON CAPTURE AND UTILIZATION (CCU)

- Carbon capture technologies integrated with hydrogen production
- Utilization pathways for captured carbon dioxide (CO_2)
- Chemical processes for converting CO_2 into value-added products

RENEWABLE ENERGY INTEGRATION

- Solar panel configurations for electrolysis
- Wind turbine setups for hydrogen production
- Hydroelectric power systems integrated with electrolysers

FUEL CELL TECHNOLOGIES

- Solid Oxide Fuel Cells (SOFC)
- Molten Carbonate Fuel Cells (MCFC)
- Alkaline Fuel Cells (AFC)
- Direct Methanol Fuel Cells (DMFC)
- Proton Exchange Membrane Fuel Cells (PEMFC)

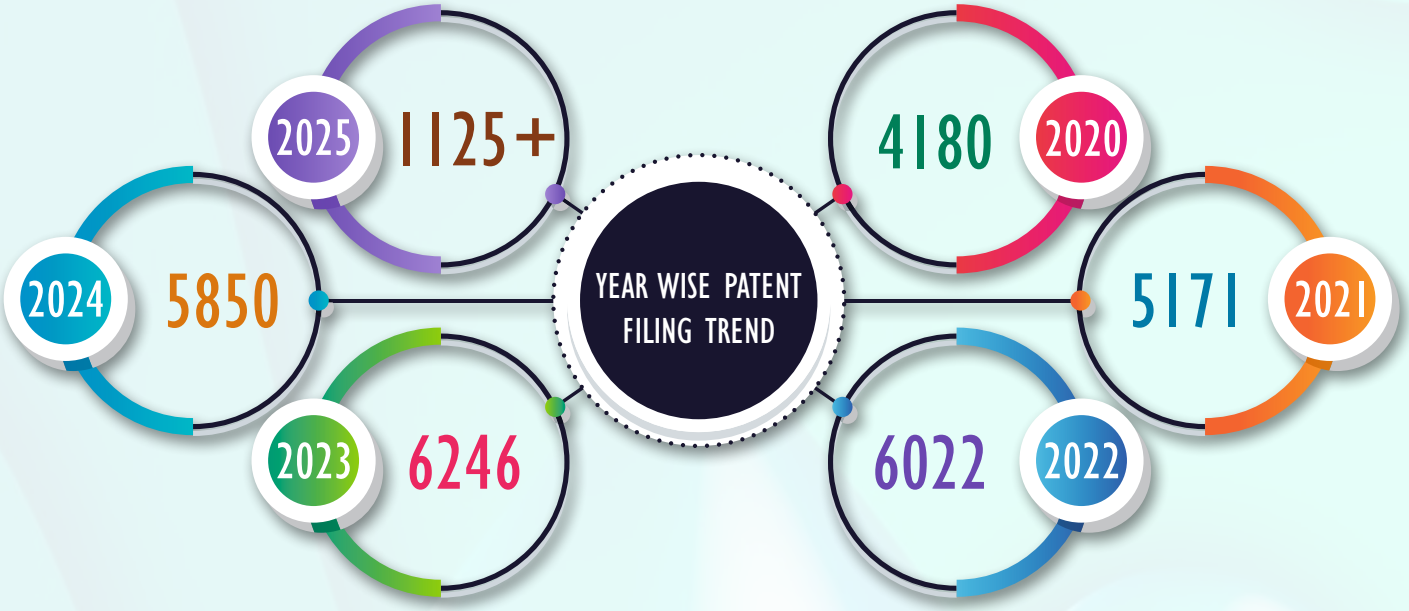
CATALYST DEVELOPMENT

- Noble metal catalyst formulations
- Non-noble metal catalysts
- Nanostructured catalyst materials
- Heterogeneous catalyst support structures

SYSTEM INTEGRATION AND AUTOMATION

- Automation systems for hydrogen production facilities
- Smart grid technologies for optimizing hydrogen production and utilization

PATENT STATISTICS



TOP APPLICANTS

316	246	246	175	149
China Petroleum & Chemical	Xi'an Jiaotong University	Zhejiang University	Beijing University of Technology	Harbin Institute of Technology
143	126	123	117	117
SGCC - State Grid Corporation of China	Wuhan Igrove Hydrogen Energy Automobile	Dalian University of Technology	Dalian Institute of Chemical Physics Chinese Academy of Sciences	North China Electric Power University

Date Range: 01/01/2020 to 22/06/2025
Database: Questel Orbit

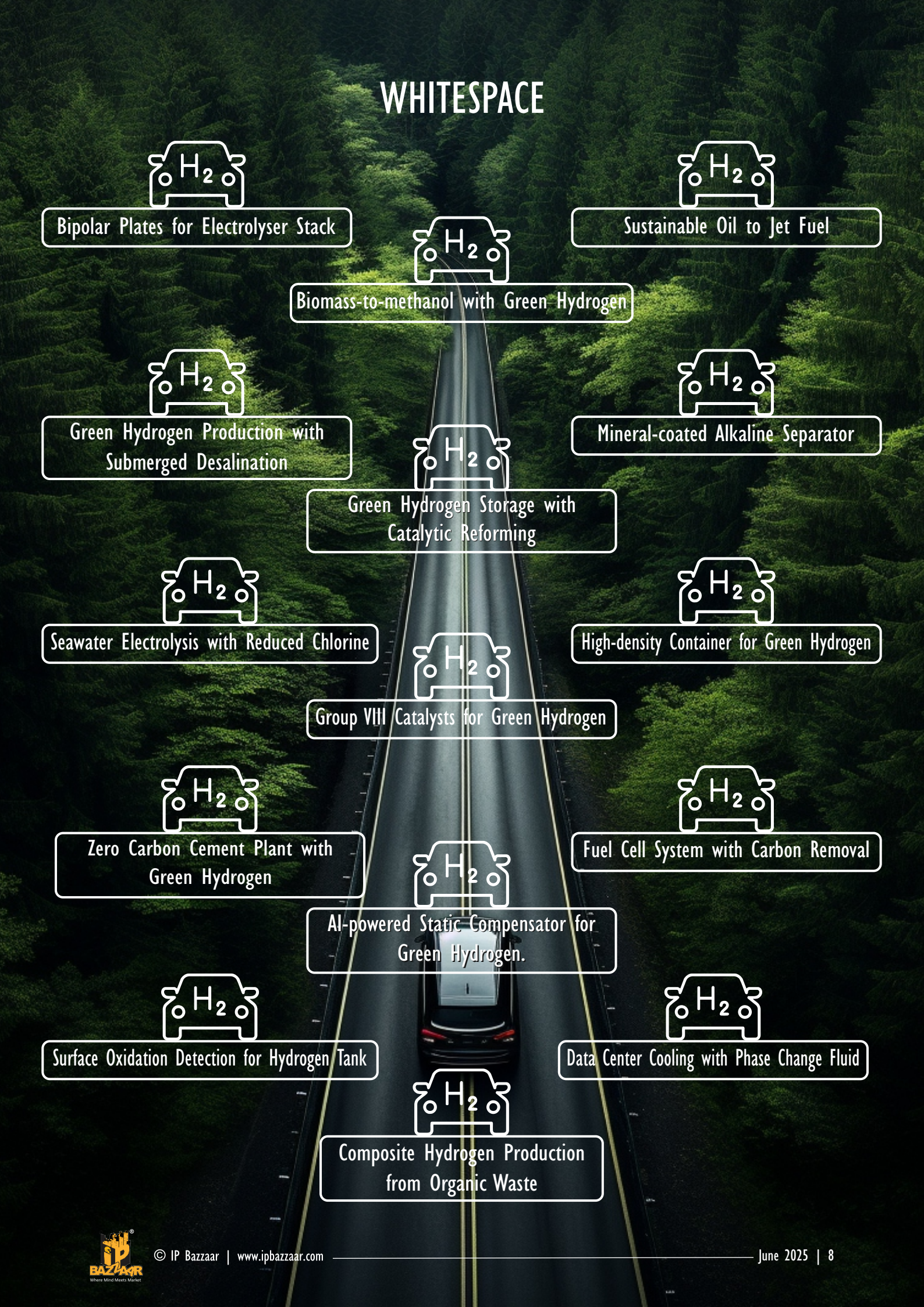
PATENT LANDSCAPE

Date Range: 01/01/2020 to 22/06/2025
Database: Questel Orbit

NOTABLE INVENTIONS

Patent Application	Priority Date	Title	Assignee
US490437	Nov 12, 1891	Hydrogen Gas Generator	Allen Horatio P
DE4007541	Mar 9, 1990	Direct Conversion of Heat into Electrical Energy - using Solar Collector to Transfer Hydrogen from Stove to High Pressure Chamber Bounded by Foil Coated Electrolyte	Kernforschungszentrum Karlsruhe Gmbh
CA2352626	Jul 12, 2001	Coupling for Linking a Hydrogen Fuel Cell to an Enzyme Bioreactor for Processing and Sequestering CO_2	CO_2 Solution Inc
US8932374	Jun 12, 2008	Method and Equipment for Producing Hydrogen from Biomass	Cortus Ab
JP2016073027	Sep 26, 2014	Method for Treating Residual Hydrogen Gas in Fuel Cell System for Electric Vehicle	Toyota Motor Corp
CN108067164	Nov 17, 2016	Hydrogenation Reactor and Hydrogenation Technique	China Petroleum & Chem Corp,
CN109291809	Oct 15, 2018	Hydrogen Energy Vehicle Drainage Control Method and Device and Storing Equipment	Wuhan Igrove Hydrogen Energy Automobile Co Ltd
US20200168924	Nov 28, 2018	Hydrogen Circulation Pump for Fuel Cell System and Fuel Cell System	Toyota Jidoshokki
US11885465	May 10, 2022	Systems for Refueling Cryo-compressed Hydrogen Tanks and Methods for Operating the Same	General Electric Company

WHITESPACE


Bipolar Plates for Electrolyser Stack
Sustainable Oil to Jet Fuel
Biomass-to-methanol with Green Hydrogen
Green Hydrogen Production with Submerged Desalination
Mineral-coated Alkaline Separator
Green Hydrogen Storage with Catalytic Reforming
Seawater Electrolysis with Reduced Chlorine
High-density Container for Green Hydrogen
Group VIII Catalysts for Green Hydrogen
Zero Carbon Cement Plant with Green Hydrogen
Fuel Cell System with Carbon Removal
AI-powered Static Compensator for Green Hydrogen.
Surface Oxidation Detection for Hydrogen Tank
Data Center Cooling with Phase Change Fluid
Composite Hydrogen Production from Organic Waste

OUR SERVICES

Tech Transfer

We facilitate Technology transfer which involves the process of transferring skills, knowledge, technologies, methods of manufacturing, samples of manufacturing, and facilities among governments, universities, and other institutions to ensure that scientific and technological developments are accessible to a wider range of users.

Tech In-Out Search

The service aims to facilitate the exploration and retrieval of relevant technological information, aiding in the transfer of technology from research or development phases to practical implementation or commercialization.

Tech Due Diligence

We help in Tech due diligence that involves a comprehensive examination and assessment of a company's technology assets, intellectual property, and overall technical capabilities to evaluate potential risks and opportunities before a business transaction, such as mergers, acquisitions, or investments.

IP Portfolio Management

IP portfolio management involves strategically overseeing and optimizing a company's intellectual property assets, including patents, trademarks, and copyrights, to align with business goals, protect innovations, and maximize their value and impact in the market.

Tech Consulting

Tech consulting involves providing expert advice and guidance on technological strategies, solutions, and implementations to help businesses optimize their IP assets, enhance efficiency, and achieve their overall objectives.

A Freedom to Operate Search

A Freedom to Operate (FTO) search is a comprehensive analysis conducted to assess whether a product, process, or technology can be developed, used, and commercialized without infringing upon existing patents or intellectual property rights, ensuring legal compliance and mitigating risks.

IP Valuation

IP valuation is the process of assessing and assigning a monetary value to intellectual property assets, such as patents, trademarks, and copyrights, considering factors like market demand, competitive landscape, and potential revenue generation.

License & Royalty

License and Royalty services involve the management and negotiation of agreements where intellectual property (IP) rights are leased out by the IP owner (licensor) to another party (licensee). In exchange for the right to use the IP, the licensee typically pays royalties to the licensor.

IP Merger & Acquisition

IP merger and acquisition involve the strategic integration of intellectual property assets during a business merger or acquisition, aiming to leverage and maximize the value of patents, trademarks, and other IP elements for enhanced competitiveness and market positioning.

ESG Advisory

Environmental, Social, and Governance (ESG) Advisory services assist companies in developing and implementing strategies related to sustainability and corporate responsibility. These services cover a range of areas including environmental impact assessment, social responsibility initiatives, and governance practices.

IP Auctions

IP auctions involve the public sale of intellectual property assets, such as patents, trademarks, or copyrights, where interested buyers bid for ownership rights, providing a platform for monetizing and transferring intellectual property.

Pitch Deck and Deal Making

A pitch deck is a concise presentation outlining key aspects of a business or project, used in deal making to communicate its value proposition and attract potential investors or partners. Deal making involves negotiations and agreements aimed at finalizing business transactions, investments, or partnerships based on the information presented in the pitch deck.

White Space Analysis

Whitespace analysis involves identifying and exploring untapped opportunities or gaps in the market, helping businesses discover areas for innovation and strategic growth by assessing areas where competitors may not be present or adequately addressing consumer needs.

Tech Incubator

A tech incubator is a supportive environment or organization that fosters the growth and development of early-stage technology startups, providing resources, mentorship, and infrastructure to help them succeed in the initial stages of their business.

Tech Mining

Tech mining is the process of extracting valuable knowledge, patterns, and insights from large volumes of scientific and technical literature, patents, and other sources to identify emerging technologies, trends, and innovation opportunities.

Tech Landscape

A tech landscape refers to the overall view of the current state and dynamics of technology within a specific industry or field, encompassing existing technologies, trends, competitors, and potential opportunities or challenges.

If you would like to learn more about any of these areas or have specific questions, we're here to provide further information and insights. Our team is dedicated to driving progress and staying at the forefront of Green Hydrogen Technology.

About IP Bazzaar

IP Bazzaar is an initiative towards successful commercialization of Intellectual Property Rights. IP Bazzaar is a private limited company, acts for both innovators/creators and investors; and manages the commercialisation of Intellectual Property. It operates through a wide network of association with companies, industries, industry-associations, entrepreneurs, government organization, NGOs, Universities, Venture Capitalists, overseas law firms, overseas technology transfer companies and through Patentwire.

Disclaimer

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Where Mind Meets Market

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