INTELLOTRACKER

Hydrogen Production

April 2023

ARANCA'S QUARTERLY SECTORIAL UPDATE ACROSS FOUR DIMENSION….

Developments (01)

- Technology updates
- Disruptive innovations
- New product launches
- Product USPs
- Company expansions
- Competitor tracking
- Under-research technologies
- ……

Dynamics (02)

- New entrants/ start-ups
- Supply chain activities
- New business models
- Company financials
- Other initiatives
- ……

4D's

Drivers (04)

- Government policies & regulations
- Litigations
- Customer Insights
- Product ratings
- Influencers
- Other details
- …….

Diversification (03)

- Mergers & acquisitions
- VC investments
- Company collaborations
- Licensing activities
- Exploring alternate applications
- ……

DEVELOPMENTS

New Manufacturing Set-Ups	Constellation.	Constellation started construction on USA's first 1 MW nuclear-powered clean hydrogen production facility in the company's NineMile Point Nuclear Plant in Oswego, New York. The facility will use 1.25 MW of zero-carbon energy to produce 560 kg of clean hydrogen per day, which exceeds the plant's requirements for hydrogen. *Source:* Company website
New Manufacturing Set-Ups	HH2E	HH2E announced that it intends to build a renewable hydrogen production facility in Germany with a capacity of 100MW by 2025, to be scaled to 1GW by 2030. *Source:* ICIS
Technology / Innovations	axine	The patent describes a method for treating wastewater using an electrolysis system. The technology consists of a solid polymer electrolytic cell, and hydrogen is produced at the cathode when the pollutant in the wastewater degrades. *Source:* Patent
Technology / Innovations	Air Liquide	The technology describes a method to produce hydrogen and carbon dioxide by oxidizing a hydrocarbon mixture to obtain syngas, cooling it, then shift-reacting the cooled syngas to obtain impure carbon dioxide and hydrogen. This mixture is further cooled to remove water, and a pressure swing absorption unit recovers enriched hydrogen. *Source:* Patent
Technology / Innovations	Woodside Energy	The technology describes a method to produce hydrogen, syngas, and other products from hydrocarbons using renewable energy, such as solar energy. *Source:* Patent
Technology / Innovations		The paper describes a method to develop a hydrogen-producing photocatalyst. Photocatalysis technology, comprising S-scheme MnCo2S4/g-C3N4 heterojunction as a photocatalyst, produces hydrogen very efficiently. *Source:* Acta Physica Sinica
Technology / Innovations	LUND UNIVERSITY	The paper describes a method to improve hydrogen production by *Caldicellulosiruptor* species from a glucose and xylose mixture fed to a continuous-stirred reactor. *Source:* Nature Springer
Technology / Innovations	UFZ	The paper describes a method to produce hydrogen from light and BG-11 medium using diazotrophic cyanobacteria as biocatalysts in capillary biofilm reactors *Source:* Elsevier
Technology / Innovations	PSL menolith	The paper describes a method to obtain high yields of carbon and hydrogen from methane feedstocks using a thermal plasma pyrolysis method, which is less energy intensive than water-electrolysis. *Source:* Elsevier

DIVERSIFICATION

Company Collaboration	H_2PRO Sumitomo Corporation	H2Pro and partnered on green hydrogen initiatives for $250 million. Sumitomo will assist H2Pro in the operation of its pilot project and supply them with manufacturing equipment in the first phase of the partnership while receiving H2Pro's data during this phase for strategic planning of Sumitomo's pipeline of green hydrogen projects. *Source:* Jewish Business News
Company Collaboration	H_2GO Power BAXI	H2Go Power partnered with Baxi to provide decarbonized pure hydrogen boiler for commercial applications. *Source:* PR Newswire
Company Collaboration		CWP Global signed an MoU with Hydrogen Optimized to integrate 500-750 MW RuggedCell™ green hydrogen plants with the company's wind and solar portfolio. It achieved high-performance benchmarks in the project in Mauritania. *Source:* Altenergymag
Company Collaboration	Masdar Verbund	Masdar signed an MoU with VERBUND to explore the production of green hydrogen in the Central European Market. *Source:* Solar Quarter
VC Investment	PATRIMONIUM	Enaptor received €25 million in bearer bonds from Patrimonium Middle Market Debt Fund to fulfill the first two years of purchase orders for its plug-and-play Anion Exchange Membrane electrolyzer technology that converts water to hydrogen energy and oxygen molecules. *Source:* Tech EU
VC Investment		Hystar raised $26 million from AP Ventures, Mitsubishi Corporation, Finindus, Nippon Steel Trading, Hillhouse Investment, Trustbridge Partners, SINTEF Ventures and Firda for its green hydrogen-producing PEM electrolysers. *Source:* Finsmes
VC Investment	ESSAR	Essar group will invest $1.2 billion in India for production of low-cost green hydrogen and ammonia, from a combined total of $3.6 billion going towards the project in UK and India *Source:* Indian Express

DRIVERS

Government Policies		The government of India is targeting 5 MT of green hydrogen production by 2030, with 35,000 crore rupees budgeted towards capital investments for energy transitions and net zero objectives. *Source: Deccan Herald*
Government Policies		The government of Canada announced in its budget 2023 plans details on the Clean Hydrogen Investment Tax Credit (ITC). It also outlined Canada Growth Fund's role in helping launch Canada's green hydrogen sector. *Source: PR Newswire*
Government Policies		The EU aims to establish an end-to-end hydrogen value chain through the European Hydrogen Bank, the financing of which will be backed through an auction system to support producers through a fixed premium per kg for up to 10 years of operation. *Source: European Commission*
Others		The government of the UK has shortlisted 20 electrolytic hydrogen projects to allocate funds towards to kick-start the low carbon hydrogen economy across the UK. *Source: Official Government Website*

SOLUTION PORTFOLIO – TECHNOLOGY RESEARCH & ADVISORY

IP Strategy	Technology Intelligence	Growth & Strategy
How best can we proactively manage and monetise our technical knowhow / intellectual property?	How best can we keep abreast of technology trends, competitor activity and headwinds / tailwinds in our domain?	Which technologies do we invest in? How do we ensure quick wins? Speed to market?
▪ IP Portfolio Analysis	▪ Competitor Benchmarking	▪ R&D Strategy Roadmaps
▪ IP Monetisation	▪ Tech / IP Landscapes	▪ Technology Scouting
▪ IP Valuation	▪ Technology Watch	▪ Open Innovation
▪ Prior Art Searches	▪ Market Analysis / Trends	▪ Product Development

GROWTH ADVISORY

INVESTMENT RESEARCH & ANALYTICS

VALUATION & FINANCIAL ADVISORY

TECHNOLOGY RESEARCH & ADVISORY

PROCUREMENT & SUPPLY CHAIN INTELLIGENCE