

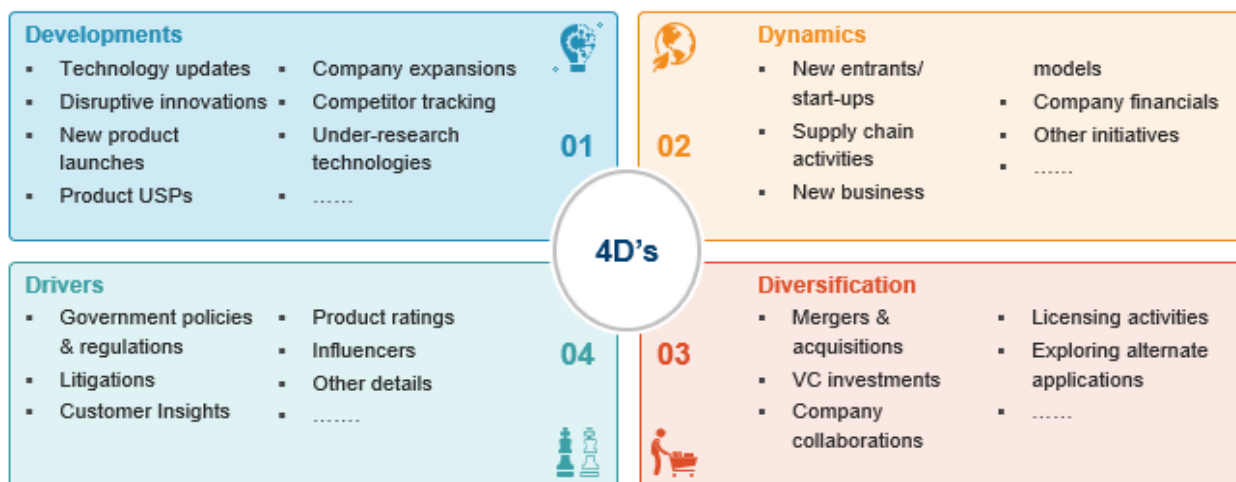
INTELLOTRACKER

Carbon Utilisation

April 2023



ARANCA'S QUARTERLY SECTORIAL UPDATE ACROSS FOUR DIMENSIONS....





DEVELOPMENTS

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| New Manufacturing Set-up | | NTPC India had released a 3D model of 'CO ₂ to Methanol Synthesis' (CTM) project where 20 TPD CO ₂ capture plant was already tested in last quarter to produce 10 TPD Green Methanol as part of its commitment towards Net Zero by 2070. <i>Source: Company news</i> |
| Technology/Innovations | | The first fully integrated direct air capture (DAC)-to-concrete production facility to be built in Arizona has received a \$150,000 grant from the 4 Corners Carbon Coalition. <i>Source: GlobalNewswire</i> |
| Technology/Innovations | | By electro synthesising captured CO ₂ into several organic compounds was researched by Cornell University researchers. They could make two entirely distinct compounds, both of which are helpful in medicinal chemistry, by altering the type of electrochemical reactor. <i>Source: University Website</i> |
| Technology/Innovations | | Researchers at the National Renewable Energy Laboratory (NREL) and other DOE national laboratories are creating electrolyzers to convert carbon dioxide (CO ₂) waste into "e-fuels" by utilising inexpensive energy generated by wind turbines. <i>Source: Government Organisation</i> |
| Technology/Innovations | | In a demonstration project run by CarbonCure Technologies and Heirloom, carbon dioxide (CO ₂) captured using direct air capture (DAC) can permanently retained in concrete for the first time. <i>Source: Company News</i> |




DYNAMICS

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| Supply Chain Activity | | The project partnered between Osaka Gas and MHI (Mitsubishi Heavy Industries) will investigate strategies for capturing CO ₂ emissions from Hard-to-Abate industries like steel, cement, and chemicals and for shipping liquefied CO ₂ . <i>Source: Company News</i> |
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DIVERSIFICATION

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| Company Collaboration | | BP and CarbonFree announce a partnership for CCUS projects utilising SkyCycle™ technology which absorbs and uses carbon emissions from industrial sources that are difficult to abate by turning CO ₂ into specialised compounds like calcium carbonate. <i>Source: Company News</i> |
| Company Collaboration | | Adnoc will work with the British-Omani sustainability firm on a trial project to permanently turn carbon dioxide from the atmosphere into a mineral within rock formations in Fujairah. <i>Source: The National News</i> |
| Company Collaboration | | United States Steel Corporation and CarbonFree Chemicals Holdings have signed a MoU to jointly pursue the capture of CO ₂ emissions using CarbonFree's SkyCycle™ technology to generate calcium carbonate for use in chemical industry. <i>Source: Company news</i> |
| Company Collaboration | | Carbon Sink aims to use CO ₂ to produce green methanol in collaboration with Red River Energy's South Dakota ethanol plant to power a major player in the shipping sector (Maersk). <i>Source: Ethanol Producer Magazine</i> |
| Mergers & Acquisitions | | KBR has acquired Aceticea™, an acetic acid production technology, which expands KBR's petrochemicals value chain through a profitable pathway for CO ₂ utilization. KBR is the only independent global licensor of acetic acid technology. <i>Source: Company News</i> |
| VC Investments | | BHP is supporting China's HBIS Group (Steel Industry) to develop two carbon utilisation technologies (slag mineralisation and biological conversion to protein) alongside with carbon capture systems. <i>Source: Company News</i> |
| VC Investments | | Evonik Industries AG has launched the PlasCO ₂ project together with three partners (The Leibniz Institute for Catalysis (LIKAT), The Leibniz Institute for Plasma Research (INP) and Rafflenbeul Anlagen Bau GmbH) to produce C4 compounds using CO ₂ as a raw source. <i>Source: Chemical Engineering</i> |
| VC Investments | | The Danish Export and Investment Fund contribute EUR 1.3 million to ALGIECEL for optimizing its technology which converts CO ₂ into highly valued commodities, including as protein, biomass rich in omega-3 fatty acids, and omega-3 oils, for use in food. <i>Source: Company News</i> |
| VC Investments | | The Department of Defense has provided \$65 million to Air Company to support its ongoing R&D activities. The Air Company's technology AIRMADE™ employs airborne CO ₂ as a feedstock to create alcohols and paraffin that are suitable for use as fuel for aircrafts. <i>Source: Carbon Herald</i> |
| VC Investments | | Sumitomo Corporation of Americas announced its cooperation with Syzygy Plasmonic' pilot program to transform two greenhouse gases, CO ₂ and CH ₄ , into low-carbon-intensity fuels that can be used to replace petroleum-based jet fuel, diesel, and gasoline. <i>Source: PR Newswire</i> |

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| VC Investments |  Sublime Systems | Sublime's proprietary process uses an electrolyser to create cement at room temperature from a variety of abundant calcium sources instead of kilns, which are the most energy- and fossil fuel-intensive part of the traditional cement manufacturing process. Source: Business wire |
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DRIVERS

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| Government Policies |  | The Carbon Management and Monetization Bill Package, submitted by Alaska Governor Mike Dunleavy as Senate Bills 48, SB 49, House Bills 49, and HB 50, establishes the legal and administrative frameworks required to take advantage of the carbon market. Source: Alaska Government |
| Government Policies |  | Canada government given approval to regulation which helps companies working on carbon capture and utilisation projects can apply for financial aid to defray the cost of the costly machinery required to sequester carbon from industrial operations underground. Source: Victoria News |
| Government Policies |  | The Captured Carbon Utilization Parity Act was presented by U.S. Senators Bill Cassidy (R-LA) and Sheldon Whitehouse (D-RI) with the goal of establishing parity between the credit value for utilisation and sequestration in the 45Q carbon capture tax credit. Source: Sheldon Whitehouse |

SOLUTION PORTFOLIO – TECHNOLOGY RESEARCH & ADVISORY



IP Strategy

How best can we proactively manage and monetise our technical knowhow / intellectual property?



Technology Intelligence

How best can we keep abreast of technology trends, competitor activity and headwinds / tailwinds in our domain?



Growth & Strategy

Which technologies do we invest in?
How do we ensure quick wins?
Speed to market?

- IP Portfolio Analysis

- IP Monetisation

- IP Valuation

- Prior Art Searches

- Competitor Benchmarking

- Tech / IP Landscapes

- Technology Watch

- Market Analysis / Trends

- R&D Strategy Roadmaps

- Technology Scouting

- Open Innovation

- Product Development



GROWTH
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SUPPLY CHAIN
INTELLIGENCE