TECH SCAN

CARBON CAPTURE, UTILIZATION AND STORAGE

BAZAAR®

WHERE MIND MEETS MARKET

Carbon Capture, Utilization and Storage (CCUS) technology signifies a transformative approach to addressing the growing challenge of carbon dioxide emissions and climate change. By integrating advanced carbon capture, separation, transportation, utilization, and storage technologies, this innovative approach seeks to reduce greenhouse gas emissions while enabling the productive use of captured CO_2. The main aim is to bring in a new phase of sustainable carbon management, where emissions are efficiently captured and either converted into valuable products or securely stored for long-term environmental protection.

The purpose of CCUS extends beyond emissions reduction, aiming to address the specific challenges faced by carbon-intensive industries such as power generation, cement, steel, chemicals, and refining. By capturing CO_2 at its source and developing pathways for its utilization in fuels, chemicals, building materials, and other applications, this approach strives to create a more sustainable and resource-efficient industrial ecosystem.

Patenting CCUS technology plays a pivotal role in this landscape. It not only protects intellectual property but also stimulates ongoing innovation by providing a competitive advantage to technology developers. This exclusivity can attract investment, foster industrial collaboration, and accelerate the commercialization of advanced carbon management solutions. As innovation continues across capture materials, conversion processes, storage methods, and integrated CCUS systems, patenting helps ensure that technological advancements contribute to a cleaner, low-carbon, and more sustainable future.

INNOVATION TIMELINE

1996

Norway's Sleipner project began large-scale geological CO_2 storage in a deep saline aquifer, establishing a landmark for dedicated carbon storage.

1970s-1980s

Large-scale CO_2 capture and pipeline transport developed mainly for enhanced oil recovery (EOR), demonstrating commercial CO_2 handling.

2000-2008

Projects including Weyburn-Midale, In Salah, and Snøhvit advanced CO_2 injection, geological storage, monitoring, and safety practices.

2010-2013

CCUS expanded into natural gas processing, fertiliser, hydrogen, and other energy-intensive industries.

2014

Canada's Boundary Dam became the first large-scale coal-fired power plant with integrated carbon capture and storage.

2015-2019

Projects such as Quest, Abu Dhabi CCS, Petra Nova, and Gorgon expanded CCUS across power, hydrogen, industrial applications, and offshore storage.

2020-2023

Innovation shifted toward CCUS hubs, shared CO_2 networks, carbon utilisation, direct air capture, and industrial decarbonisation.

2024-2025

Global CCUS development accelerated through increased investment, new projects, and expansion of capture, transport, utilisation, and storage infrastructure.

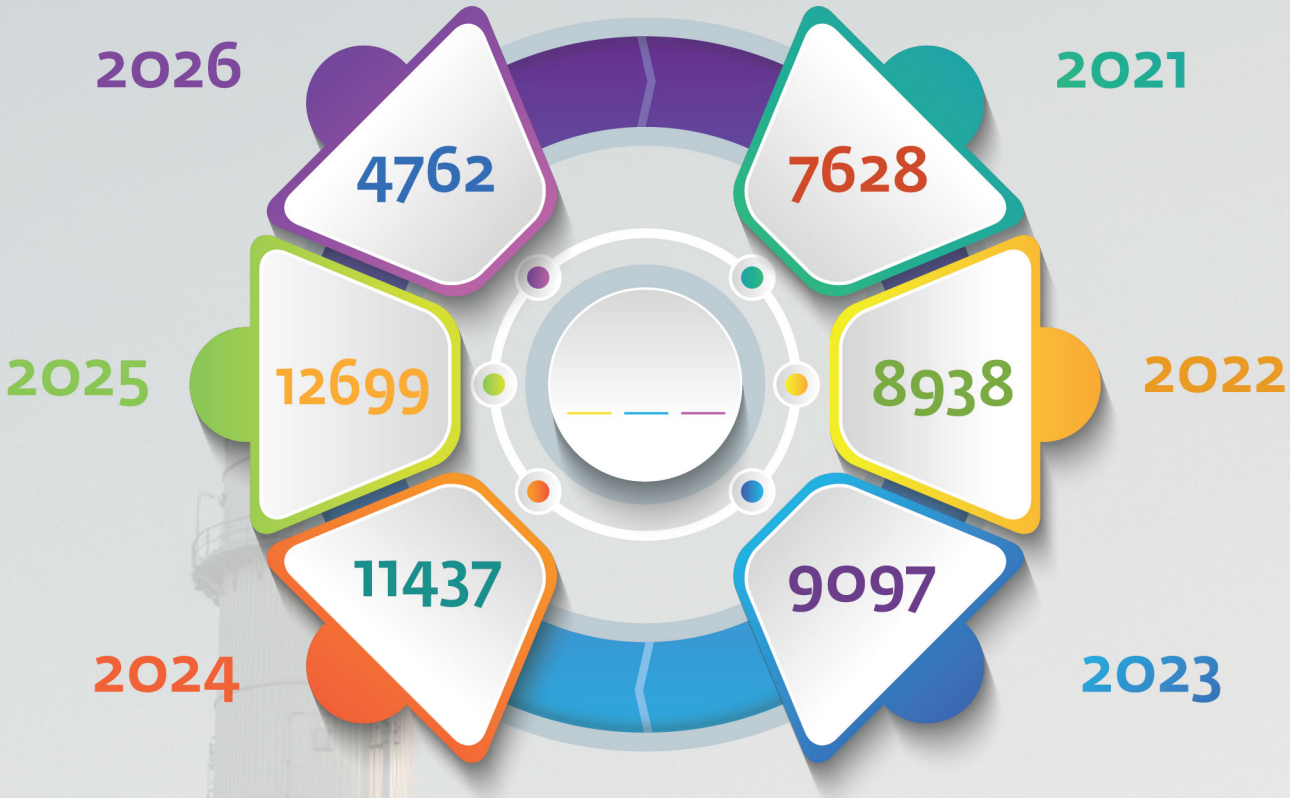
2026-Till Date

Focus is shifting toward lower-cost capture, advanced materials, integrated CO_2 networks, carbon removal, and large-scale geological storage, alongside growing CCUS research and demonstration efforts in India.

PATENTABLE COMPONENTS

- CO_2 Capture Materials and Sorbents
- Advanced Solvent-Based Capture Processes
- Membrane-Based CO_2 Separation
- Direct Air Capture (DAC) Technologies
- CO_2 Capture Process Optimization
- CO_2 Compression, Purification and Conditioning
- CO_2 Transportation and Pipeline Technologies
- Geological CO_2 Storage and Injection Methods
- CO_2 Monitoring, Measurement and Leakage Detection
- CO_2 Mineralization and Carbon Conversion
- CO_2-to-Fuels and Chemicals Utilization
- Integrated CCUS Systems and Hub Technologies

PATENT STATISTICS



PATENT LANDSCAPE

Database: Questel Orbit
Data Range: 01/06/2021 - 01/06/2026

TOP APPLICANTS

- INTEL — 923
- SEMICONDUCTOR ENERGY LABORATORY — 683
- APPLE — 416
- SANYO BUSSAN — 488
- PURE STORAGE — 327
- TOYOTA MOTOR — 291
- HUANENG CLEAN ENERGY RESEARCH INSTITUTE — 244
- BETA AIR — 269
- SAUDI ARABIAN OIL — 236
- SAMSUNG ELECTRONICS — 227

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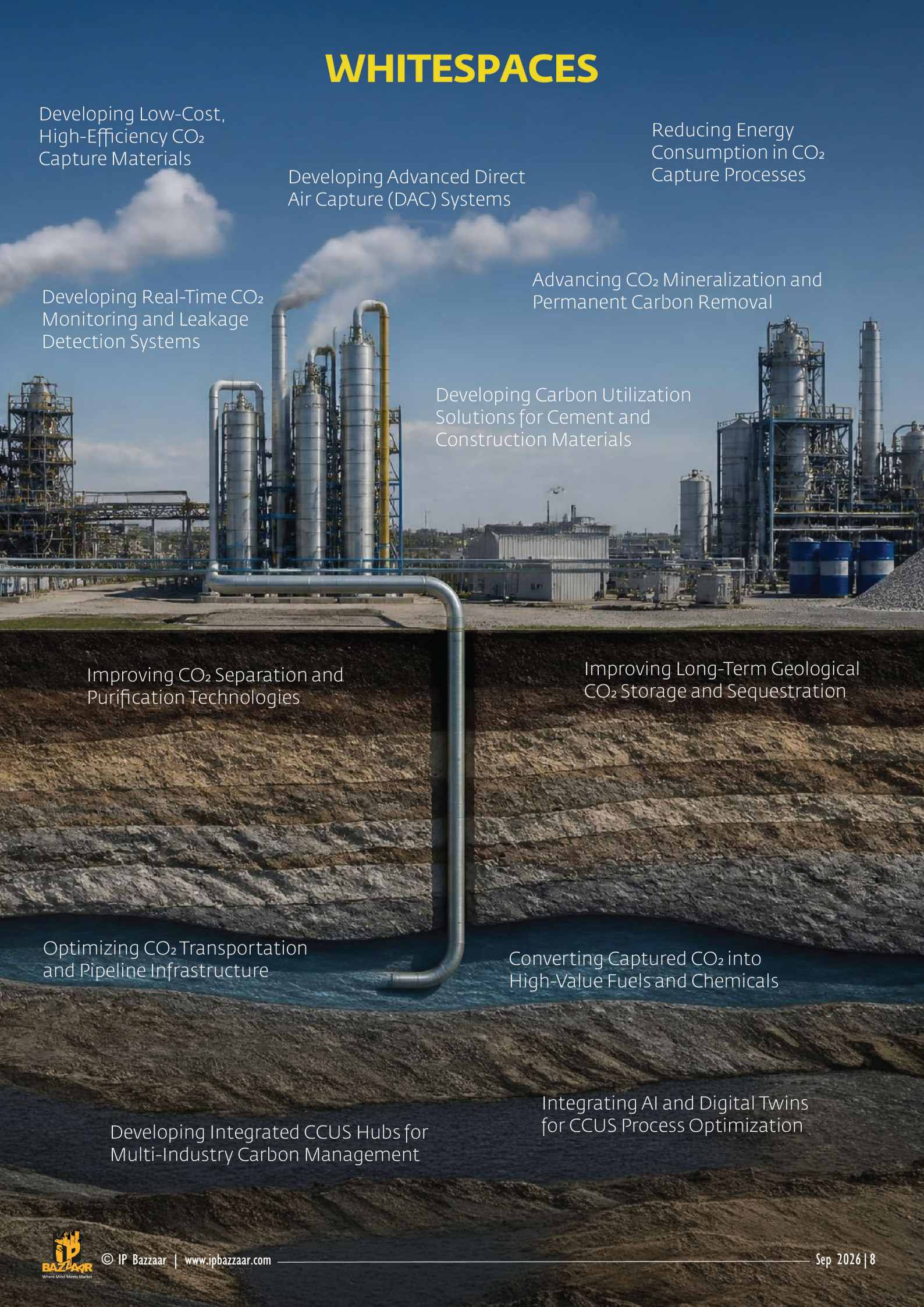
Data Range: 01/06/2021 - 01/06/2026

NOTABLE INNOVATIONS

Patent Application	Priority date	Title	Assignee
US9504952	2010-10-04	Recycling carbon dioxide via capture and temporary storage to produce renewable fuels and derived products	UNIVERSITY OF SOUTHERN CALIFORNIA
US12297759	2021-03-04	System and method for mobile carbon capture	ECHENEIDAE
US12491467	2025-05-12	Carbon capture systems and methods of use	PROVOCATIVE SCIENCE HOLDINGS
CN223263626	2024-10-24	Carbon dioxide capturing and collecting device and atmospheric carbon collecting and storing system	SHANGHAI MERCHANT SHIP DESIGN & RESEARCH INSTITUTE
US12201958	2021-08-18	Negative emission, large scale carbon capture for clean fossil fuel power generation	LYTEN
US12491467	2025-05-12	Carbon capture systems and methods of use	PROVOCATIVE SCIENCE HOLDINGS
IN202221002492	2022-01-16	Carbon capture and rehabilitation bank technologies	Huf Bhasker Thakorbhai Patel
IN202211035450	2022-06-21	Carbon capturing system and methods thereof	GRAPHIC ERA
US10790525	2013-03-15	Systems for storing, distributing and dispatching energy on demand using and recycling carbon	ZIET
US12491467	2025-05-12	Carbon capture systems and methods of use	PROVOCATIVE SCIENCE HOLDINGS

WHITESPACES



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 Carbon Capture, Utilization and Storage (CCUS).

About IP Bazzaar

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