FROST & SULLIVAN

# Growth Opportunities for Carbon Capture, Storage, Transportation & Utilisation

***Key Technologies & Solutions for the Energy Transition***

*The Growth Pipeline™ Company*
*Powering clients to a future shaped by growth*

# FROST & SULLIVAN – WHO WE ARE

A **LEADING RESEARCH AND ADVISORY FIRM** WITH OFFICES IN **30 COUNTRIES**, WHO HAS PARTNERED WITH CORPORATIONS, CITIES, GOVERNMENTS, AND INVESTOR COMMUNITIES OVER THE PAST 60 YEARS TO **IDENTIFY, PRIORITIZE, AND EXECUTE OPPORTUNITIES THAT POWER CLIENTS TOWARD A FUTURE SHAPED BY GROWTH**.

**60+ Years of Research & Advisory Experience**

**3-Tiered Growth System**
**1.Generate**
**2.Evaluate**
**3.Implement**

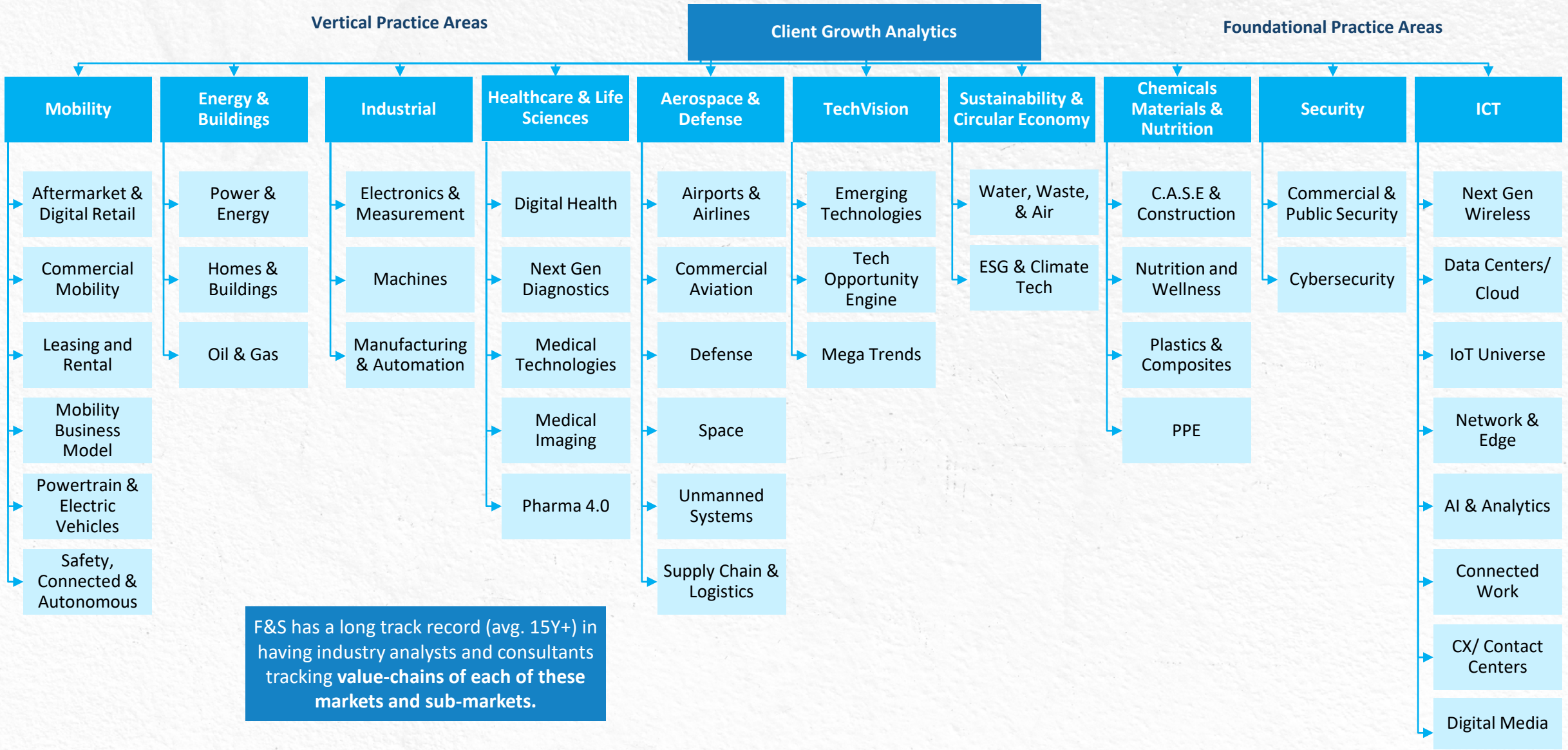

**Global Coverage**
**30+ Offices**
**Around the World**
**Advisory force on the field**

**360° Market Coverage to identify growth opportunities across multiple topics areas**

**In-House Market Insights & Intelligence combined with Strategy Consulting and Be-Spoke Advisory Solutions.**

**Trusted Partner for 16,000+ Clients Worldwide**
**(Consolidated relationships with C-levels and decision-makers across industries)**

# OUR INDUSTRY EXPERTISE: OVER 40 PROGRAM AREAS SERVING A WIDER RANGE OF SECTORS



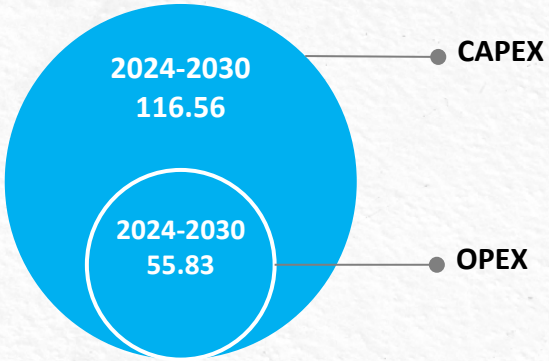

F&S has a long track record (avg. 15Y+) in having industry analysts and consultants tracking **value-chains of each of these markets and sub-markets.**

# CCUS IS ONE OF THE KEYS TO UNLOCKING THE FULL POTENTIAL OF DECARBONIZATION

The cumulative market size for the CCUS value chain including opex for capture, transport and storage from 2024 to 2030 is projected to be US$200-$250 billion. End–to–end digital solutions to measure, monitor and manage carbon dioxide across the CCUS value chain is expected to be $100 – 150 billion

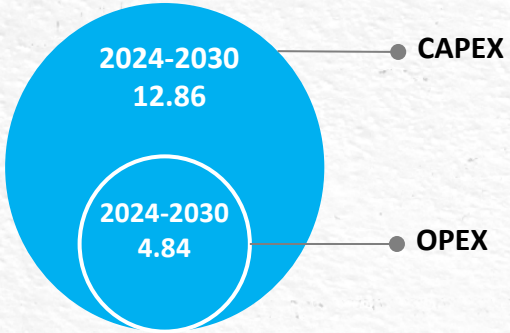
## Carbon Capture Market

**Total CAPEX and OPEX in BUSD**



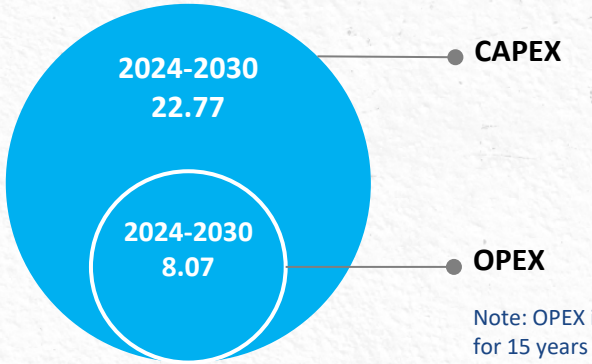

## Carbon Transport Market

**Total CAPEX and OPEX in BUSD**




## Carbon Storage Market

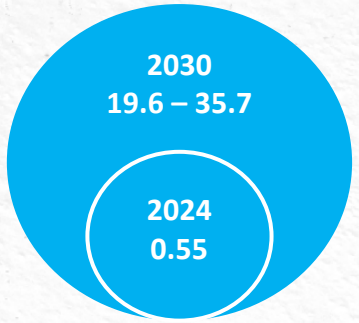
**Total CAPEX and OPEX in BUSD**




Note: OPEX is calculated for 15 years period

## Carbon Utilization Market

**Total Utilization Market Potential in BUSD**



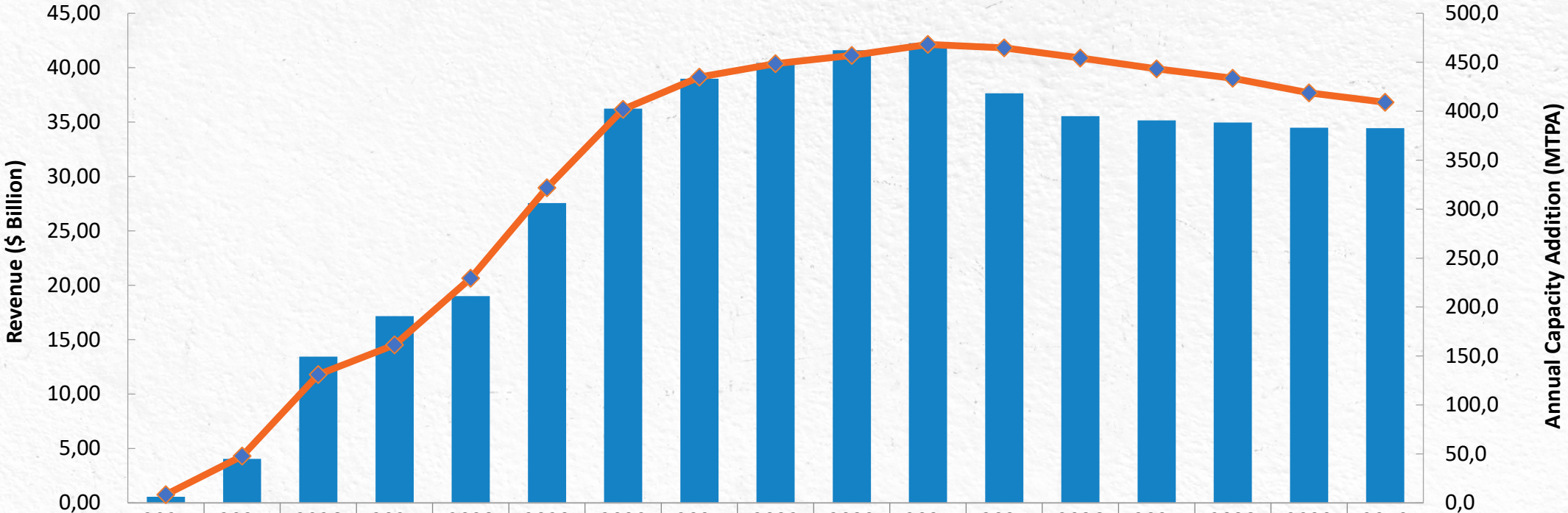

*Including Enhanced Oil Recovery

Source: Frost & Sullivan Carbon Capture Data Platform

# THE CARBON CAPTURE MARKET IS GAINING MOMENTUM WITH INCREASED INVESTMENT

The carbon capture market is forecast to grow at an CAGR of 39.5% between 2025 and 2030, mainly driven by government regulations, technical advancements

## CCUS: Carbon Capture Market Size and Annual Capacity Addition Forecast, Global, 2024-2040




| | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Revenue | 0,57 | 4,05 | 13,44 | 17,16 | 19,00 | 27,56 | 36,24 | 38,99 | 40,43 | 41,62 | 42,26 | 37,66 | 35,54 | 35,15 | 34,97 | 34,49 | 34,44 |
| Capacity Addition | 8,5 | 47,9 | 131,1 | 161,4 | 229,3 | 321,8 | 402,0 | 434,9 | 448,7 | 457,0 | 468,2 | 464,7 | 454,4 | 443,3 | 433,7 | 418,8 | 409,2 |

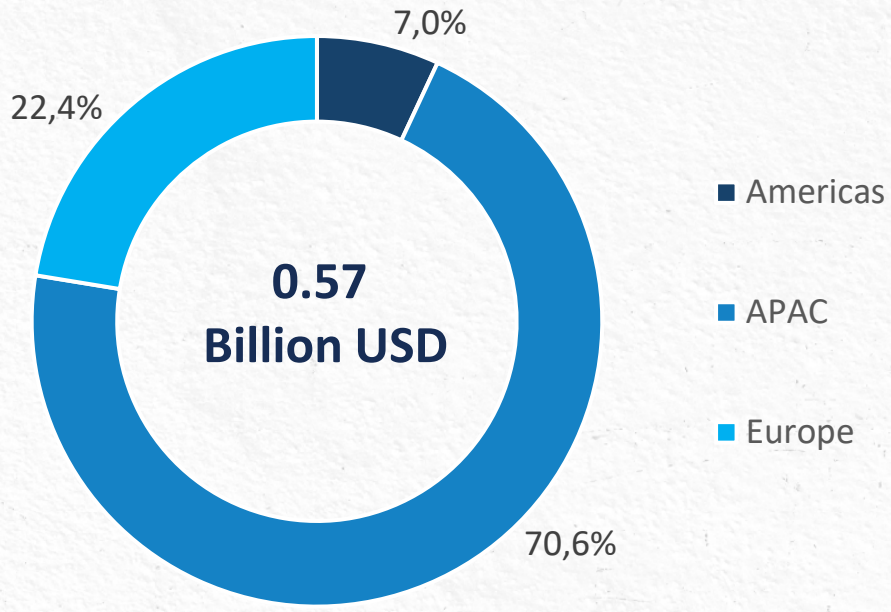
Year

Source: Frost & Sullivan Carbon Capture Data Platform

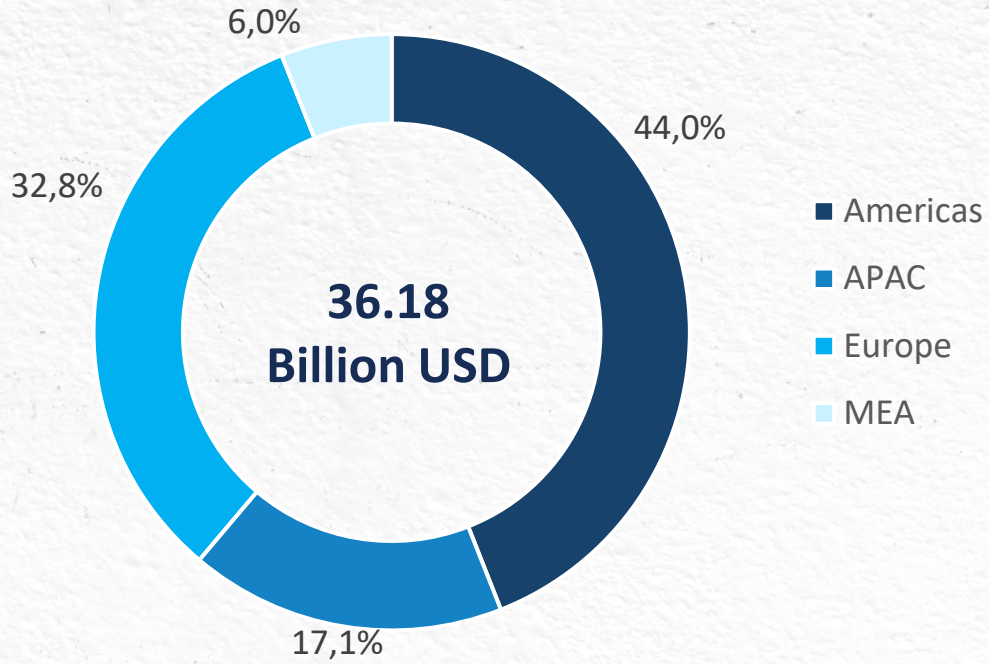
# REGIONAL OUTLOOK OF CARBON CAPTURE MARKET – POLICY AND FUNDING WILL DRIVE THE ADOPTION

Regional CCUS market growth is primarily driven by supportive policies and incentives, availability of transport & storage infrastructure, industrial cluster development, and strong financing & regulatory frameworks tailored to local emission and resource profiles.

## Carbon Capture Market Percentage Revenue Share by Region, 2024




## Carbon Capture Market Percentage Revenue Share by Region, 2030

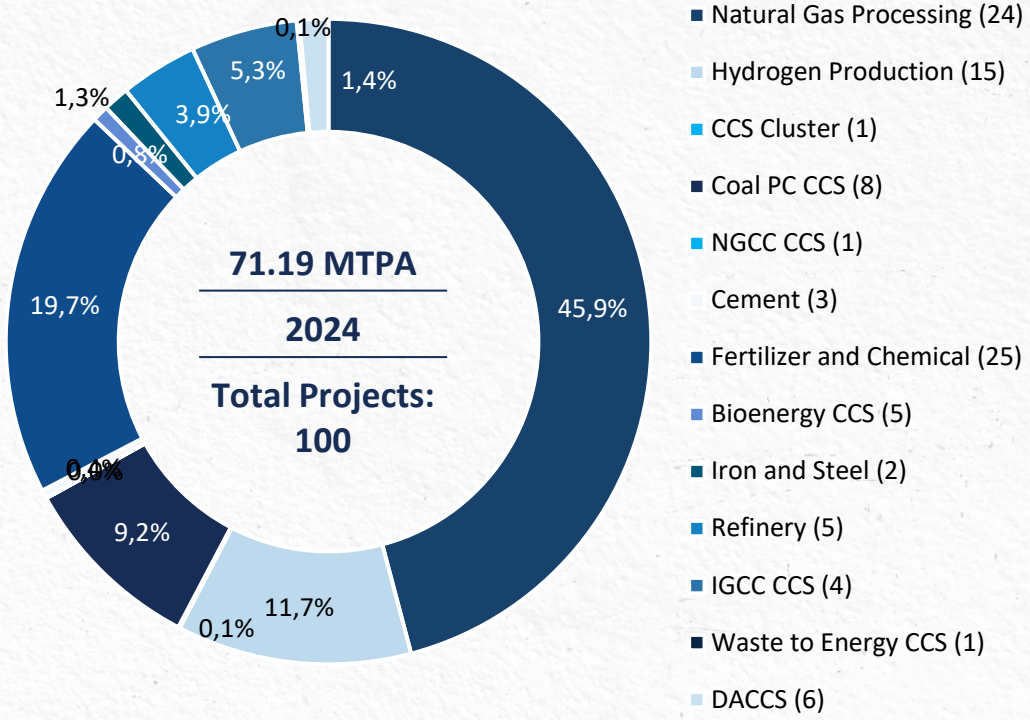



Source: Frost & Sullivan Carbon Capture Data Platform

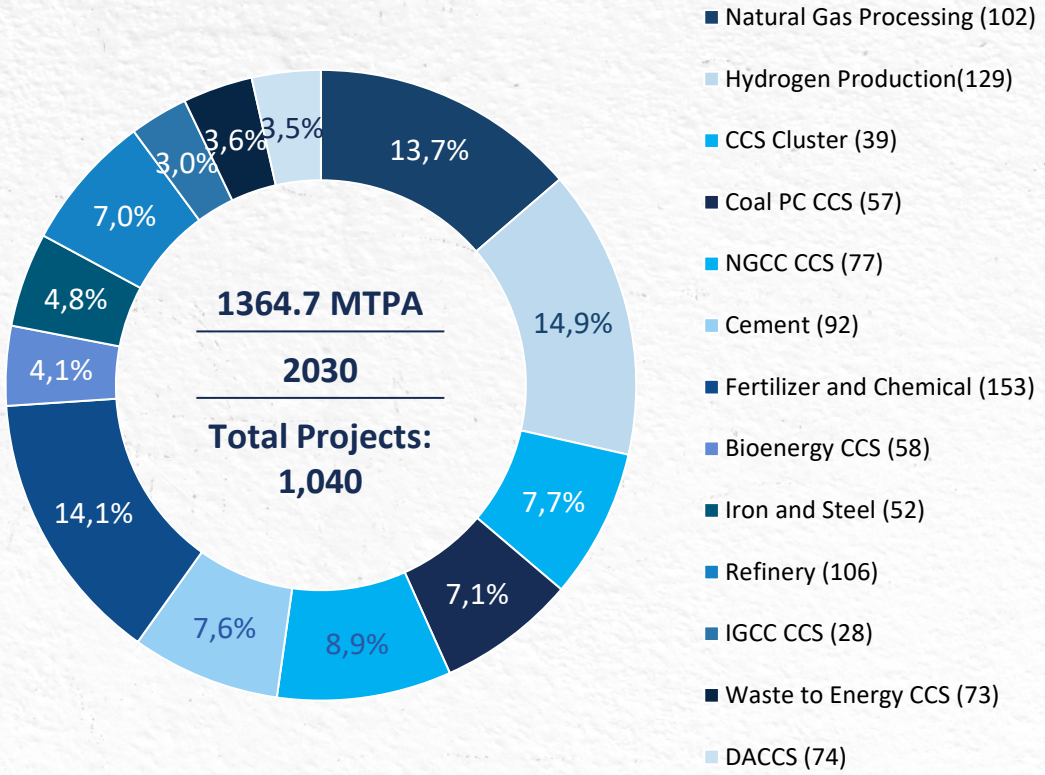
# DIVERSE INDUSTRIES INCLUDING HARD-TO-ABATE SECTOR CONTRIBUTE TO GROWTH OF CARBON CAPTURE

Although the Oil & Gas Industry is front runner in adopting CCUS, hard-to-abate industries such as cement, iron and steel, fertilizers and chemicals will be the fastest growing market mainly driven by regulatory requirements.

## CCUS: Cumulative Carbon Capture Capacity in million tons per annum (MTPA), Percentage Share by Industry, Global, 2024



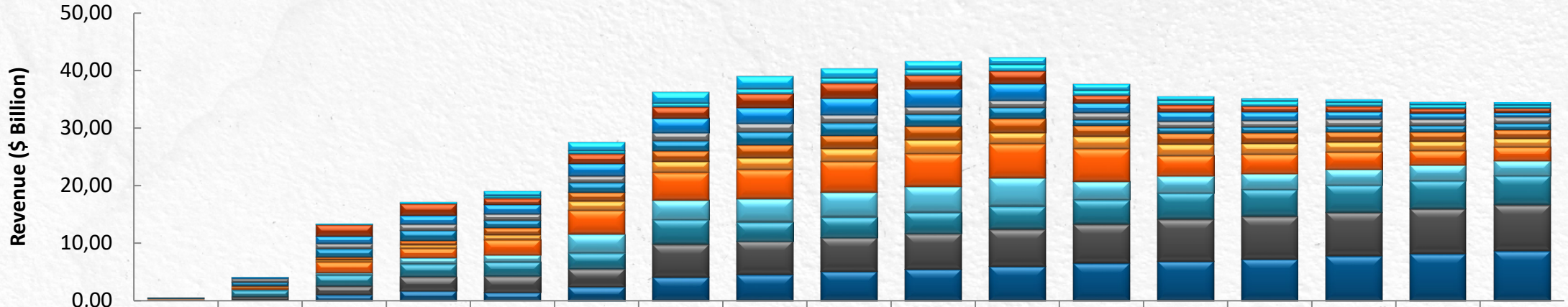

## CCUS: Cumulative Carbon Capture Capacity in MTPA, Percentage Share by Industry, Global, 2030




Source: Frost & Sullivan Carbon Capture Data Platform

# REVENUE FORECAST BY INDUSTRY APPLICATION OF CARBON CAPTURE

## CCUS: Revenue Forecast by Industry Application, Global, 2024-2040



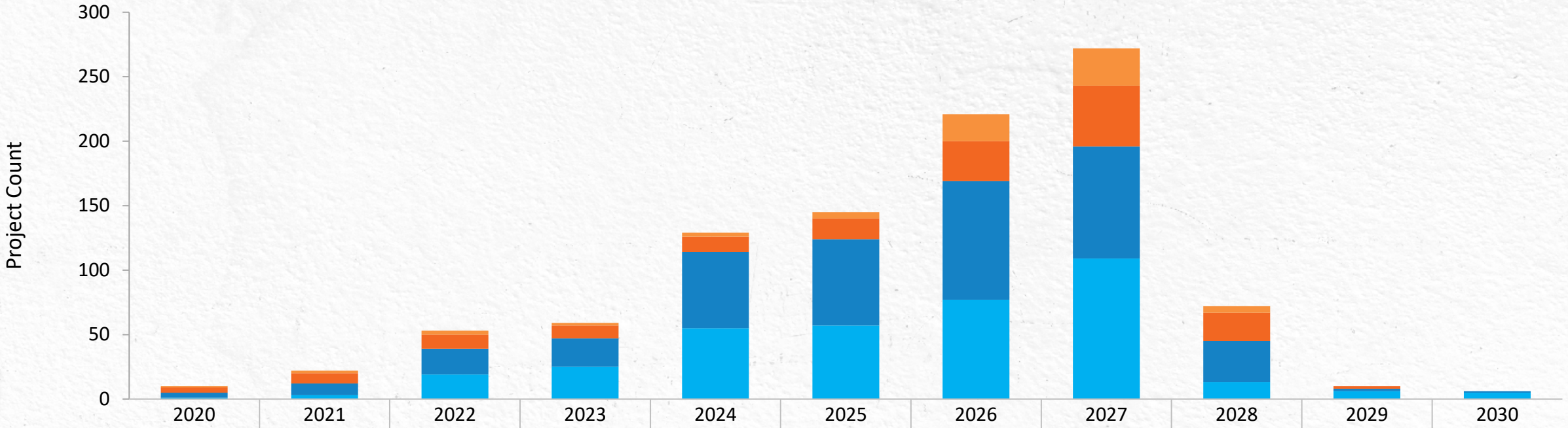

| | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IGCC CCS | 0,00 | 0,00 | 0,00 | 0,00 | 0,75 | 1,47 | 1,88 | 2,21 | 1,66 | 1,38 | 1,22 | 1,12 | 0,71 | 0,53 | 0,49 | 0,45 | 0,45 |
| Waste to Energy CCS | 0,00 | 0,01 | 0,24 | 0,27 | 0,45 | 0,59 | 0,67 | 0,80 | 0,97 | 1,05 | 1,10 | 0,84 | 0,78 | 0,80 | 0,70 | 0,64 | 0,55 |
| CCUS Clusters | 0,00 | 0,01 | 2,00 | 2,08 | 1,03 | 1,69 | 1,97 | 2,44 | 2,61 | 2,37 | 2,22 | 1,34 | 1,24 | 1,03 | 0,93 | 0,83 | 0,76 |
| Coal Fired Power Plant | 0,00 | 0,20 | 1,27 | 1,53 | 1,71 | 2,14 | 2,52 | 2,66 | 2,85 | 3,04 | 2,85 | 1,72 | 1,65 | 1,50 | 1,32 | 1,03 | 0,78 |
| NG processing | 0,10 | 0,62 | 0,87 | 1,08 | 1,05 | 1,16 | 1,41 | 1,51 | 1,44 | 1,37 | 1,27 | 1,15 | 1,08 | 1,10 | 1,18 | 1,08 | 1,01 |
| Fertilizer and Chemical | 0,22 | 0,69 | 1,44 | 1,81 | 1,39 | 1,67 | 1,76 | 2,23 | 2,14 | 2,05 | 1,96 | 1,06 | 1,00 | 1,03 | 1,05 | 1,10 | 1,15 |
| Refinery | 0,13 | 0,13 | 0,52 | 0,70 | 1,21 | 1,57 | 1,80 | 2,24 | 2,34 | 2,41 | 2,44 | 1,92 | 1,90 | 1,83 | 1,70 | 1,61 | 1,50 |
| Iron and Steel | 0,00 | 0,17 | 0,38 | 0,59 | 0,80 | 1,58 | 1,96 | 2,08 | 2,24 | 2,40 | 1,93 | 2,09 | 1,98 | 1,87 | 1,76 | 1,65 | 1,54 |
| NG fired Power Plant | 0,00 | 0,29 | 1,87 | 1,70 | 2,67 | 4,20 | 4,79 | 5,12 | 5,36 | 5,71 | 5,95 | 5,71 | 3,55 | 3,35 | 2,96 | 2,50 | 2,34 |
| Cement Production | 0,02 | 0,13 | 0,41 | 1,01 | 1,18 | 3,24 | 3,40 | 4,05 | 4,32 | 4,50 | 4,95 | 3,18 | 2,94 | 2,82 | 2,79 | 2,76 | 2,64 |
| Hydrogen Production | 0,10 | 1,17 | 1,91 | 2,22 | 2,49 | 2,72 | 4,27 | 3,32 | 3,51 | 3,71 | 3,93 | 4,26 | 4,55 | 4,63 | 4,75 | 4,88 | 5,07 |
| DACCS | 0,00 | 0,52 | 1,45 | 2,44 | 2,82 | 3,17 | 5,71 | 5,81 | 5,94 | 6,21 | 6,48 | 6,75 | 7,29 | 7,43 | 7,56 | 7,83 | 7,97 |
| Bioenergy CCS | 0,00 | 0,12 | 1,05 | 1,73 | 1,45 | 2,38 | 4,09 | 4,53 | 5,07 | 5,43 | 5,97 | 6,52 | 6,88 | 7,24 | 7,78 | 8,15 | 8,69 |

Source: Frost & Sullivan Carbon Capture Data Platform

# CARBON CAPTURE, TRANSPORT AND STORAGE PROJECTS ARE GAINING MOMENTUM LEADING TO INCREASE IN FINAL INVESTMENT DECISION (FID)

Oil and gas industry is the largest developer of CCUS project with more than 200 projects in refinery, hydrogen, chemical and fertilizers to reach FID between 2024 and 2027. Heavy industries such as Iron & Steel and Cement are catching up in terms of project development with 131 projects between 2020 and 2030.

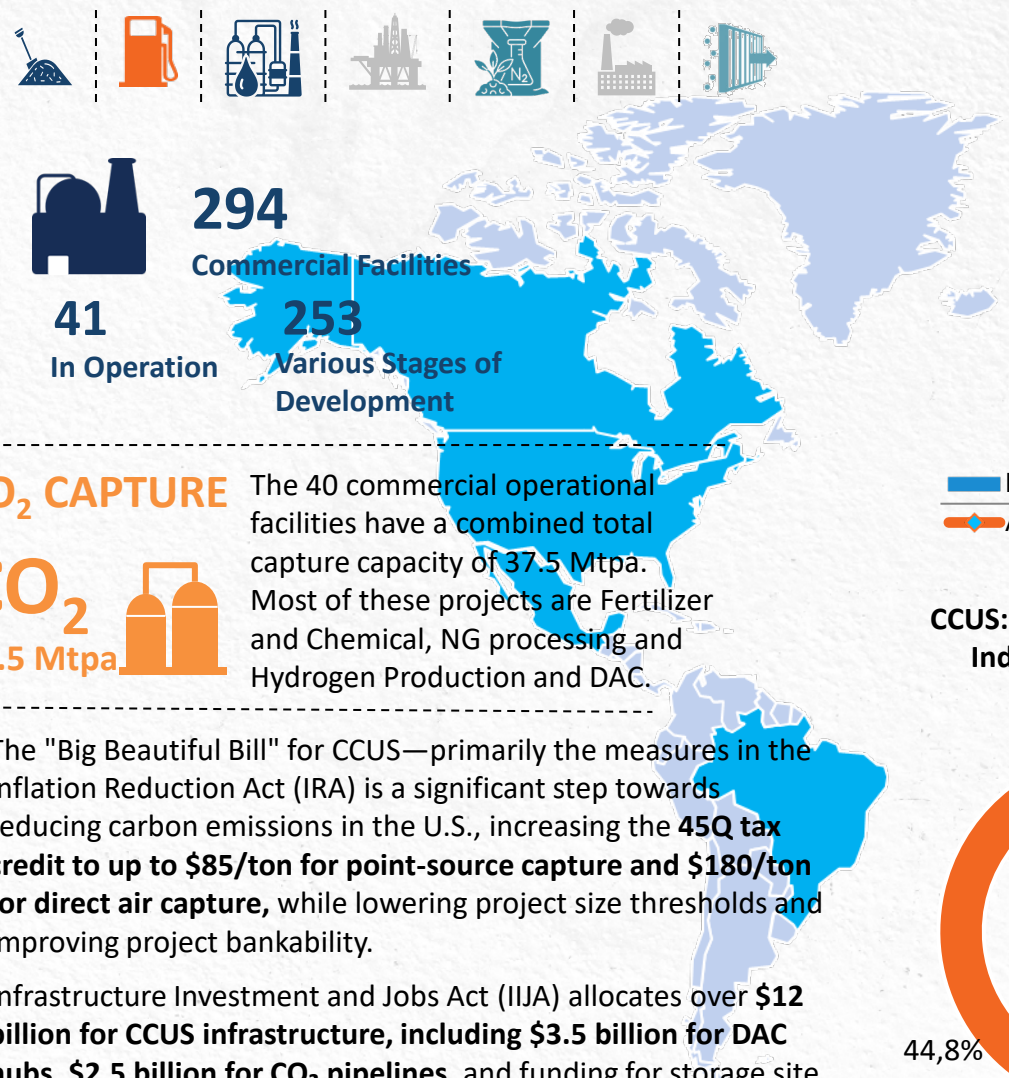
## CCUS: Carbon Capture, Projects by FID, Global, 2020-2030




| | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MEA | 1 | 2 | 3 | 2 | 3 | 5 | 21 | 29 | 5 | 0 | 0 |
| Asia Pacific | 4 | 8 | 11 | 10 | 12 | 16 | 31 | 47 | 22 | 2 | 0 |
| Americas | 4 | 9 | 20 | 22 | 59 | 67 | 92 | 87 | 32 | 2 | 1 |
| Europe | 1 | 3 | 19 | 25 | 55 | 57 | 77 | 109 | 13 | 6 | 5 |

Source: Frost & Sullivan,

# CARBON CAPTURE, UTILIZATION AND STORAGE REGIONAL TRENDS AND ANALYSIS – AMERICAS



**294**
Commercial Facilities

**41**
In Operation

**253**
Various Stages of Development

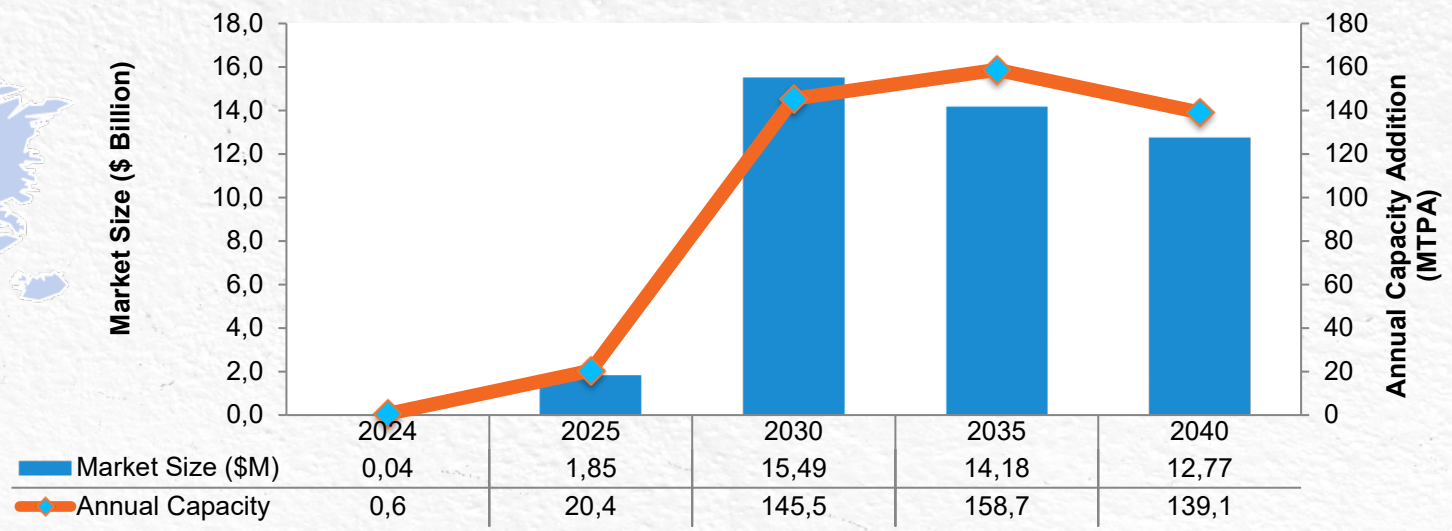
## $CO_2$ CAPTURE

**$CO_2$**
**37.5 Mtpa**

The 40 commercial operational facilities have a combined total capture capacity of 37.5 Mtpa. Most of these projects are Fertilizer and Chemical, NG processing and Hydrogen Production and DAC.

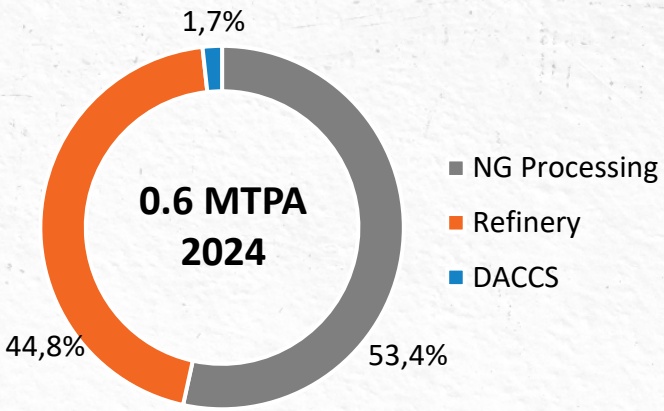
- The "Big Beautiful Bill" for CCUS—primarily the measures in the Inflation Reduction Act (IRA) is a significant step towards reducing carbon emissions in the U.S., increasing the **45Q tax credit to up to $85/ton for point-source capture and $180/ton for direct air capture,** while lowering project size thresholds and improving project bankability.
- Infrastructure Investment and Jobs Act (IIJA) allocates over **$12 billion for CCUS infrastructure, including $3.5 billion for DAC hubs, $2.5 billion for $CO_2$ pipelines,** and funding for storage site development and permitting.

**CCUS: Carbon Capture Market Size and Annual Capacity Addition Forecast, Americas, 2024-2040**

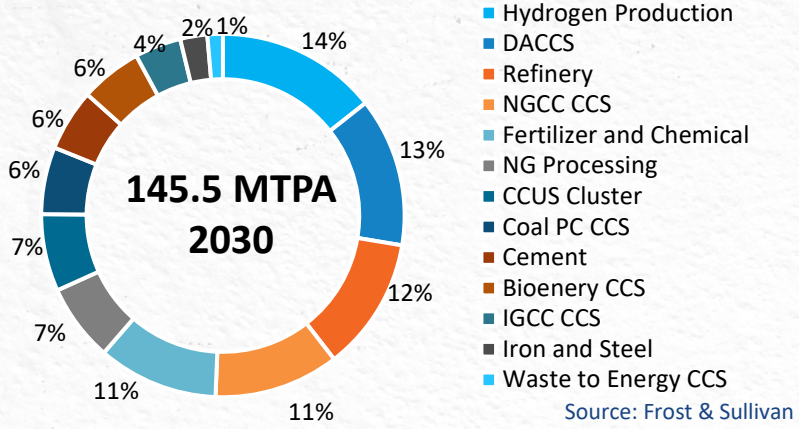



| | 2024 | 2025 | 2030 | 2035 | 2040 |
|---|---|---|---|---|---|
| Market Size ($M) | 0,04 | 1,85 | 15,49 | 14,18 | 12,77 |
| Annual Capacity | 0,6 | 20,4 | 145,5 | 158,7 | 139,1 |

**CCUS: Annual Capacity Share, By Industries, Americas, 2024**

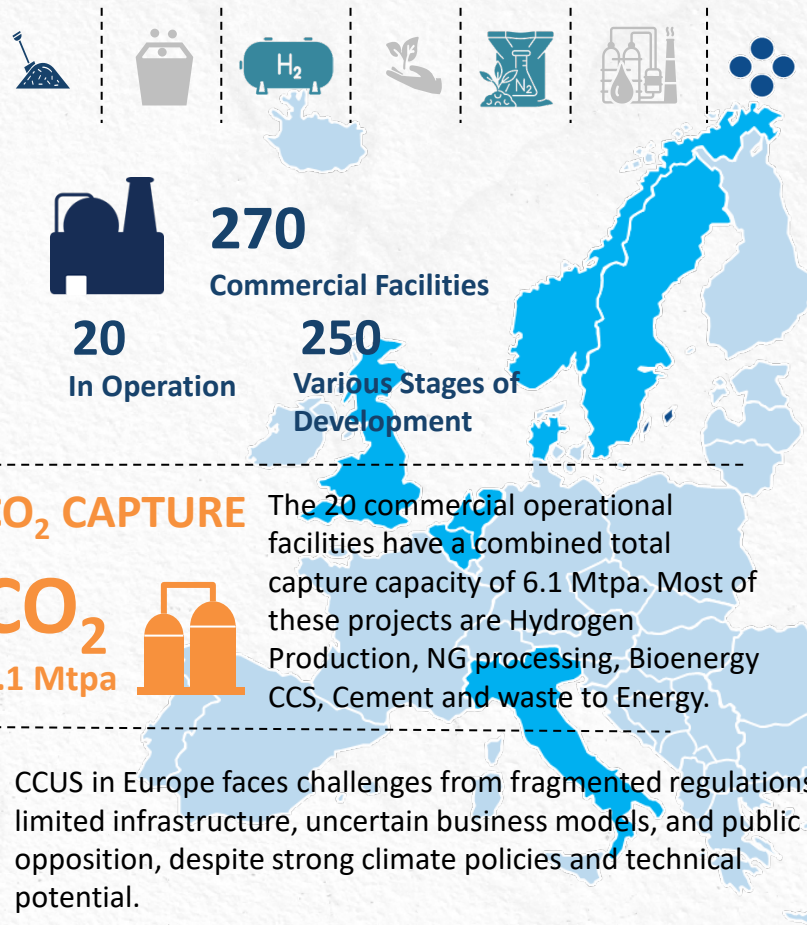



**CCUS: Annual Capacity Share, By Industries, Americas, 2030**




Source: Frost & Sullivan

# CARBON CAPTURE, UTILIZATION AND STORAGE REGIONAL TRENDS AND ANALYSIS – EUROPE



**270**
Commercial Facilities

**20**
In Operation

**250**
Various Stages of Development

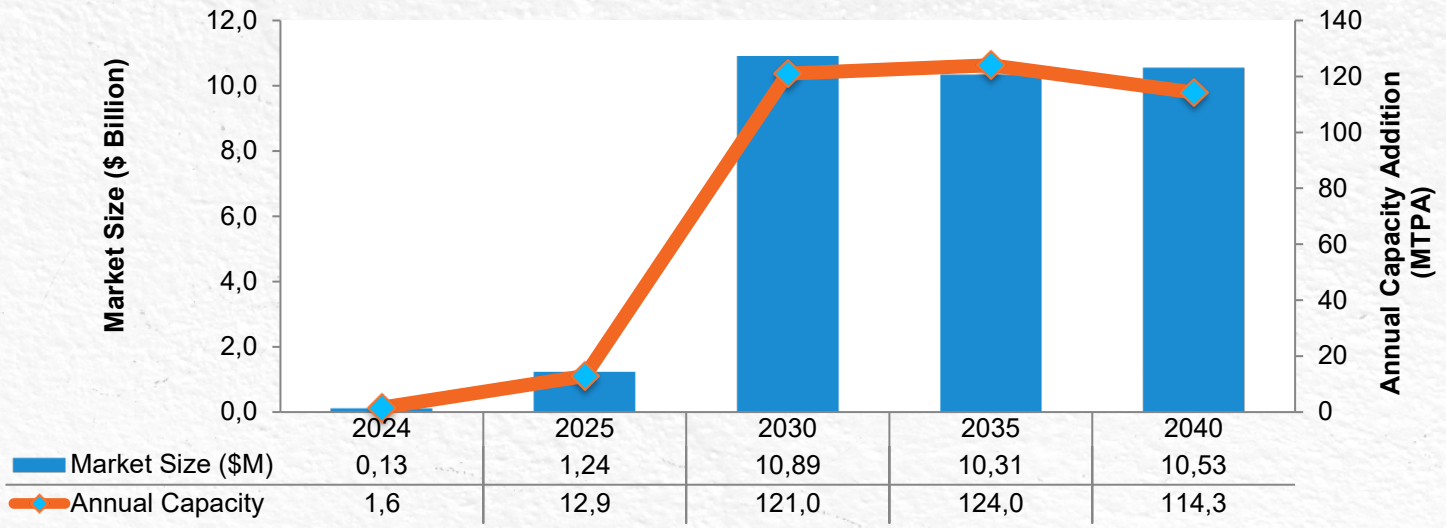
## $CO_2$ CAPTURE

**$CO_2$**
**6.1 Mtpa**

The 20 commercial operational facilities have a combined total capture capacity of 6.1 Mtpa. Most of these projects are Hydrogen Production, NG processing, Bioenergy CCS, Cement and waste to Energy.

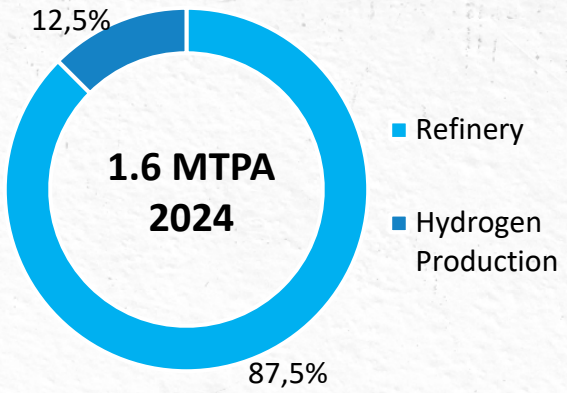
- CCUS in Europe faces challenges from fragmented regulations, limited infrastructure, uncertain business models, and public opposition, despite strong climate policies and technical potential.
- Europe's CCUS growth is driven by ambitious climate policy, high carbon prices, North Sea storage hubs, generous EU funding, and rising demand for decarbonizing heavy industry.

**CCUS: Carbon Capture Market Size and Annual Capacity Addition Forecast, Europe, 2024-2040**

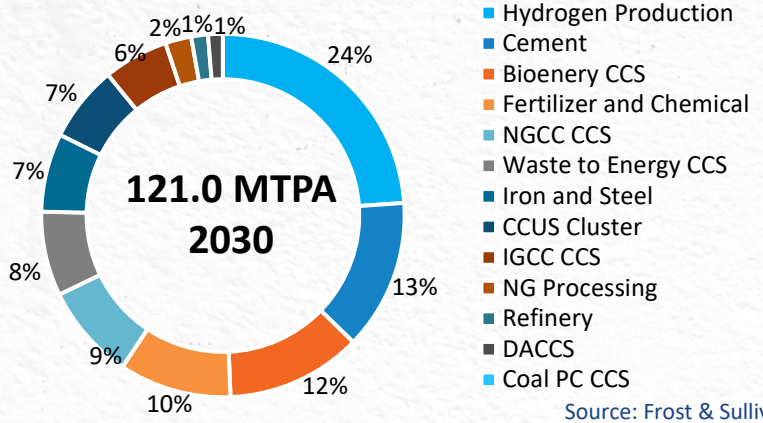



| | 2024 | 2025 | 2030 | 2035 | 2040 |
|---|---|---|---|---|---|
| Market Size ($M) | 0,13 | 1,24 | 10,89 | 10,31 | 10,53 |
| Annual Capacity | 1,6 | 12,9 | 121,0 | 124,0 | 114,3 |

**CCUS: Annual Capacity Share, By Industries, Europe, 2024**

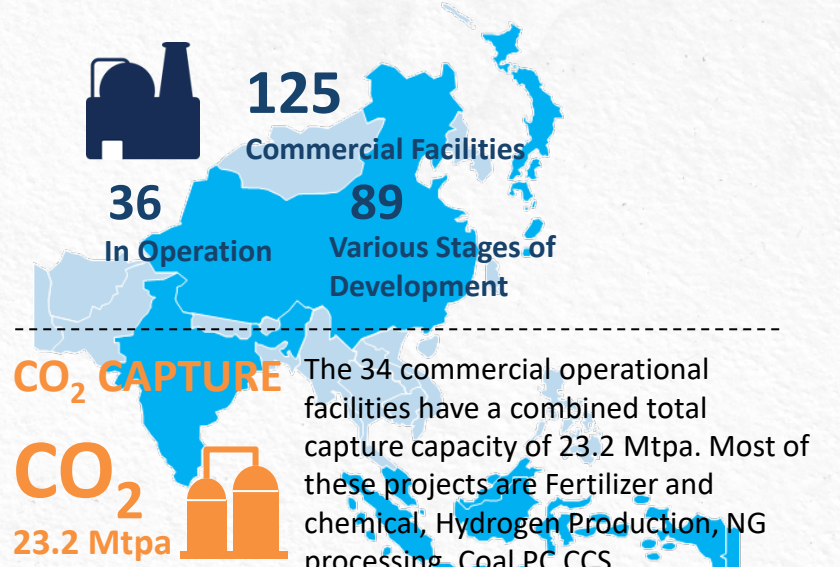



**CCUS: Annual Capacity Share, By Industries, Europe, 2030**




Source: Frost & Sullivan

# CARBON CAPTURE, UTILIZATION AND STORAGE REGIONAL TRENDS AND ANALYSIS – ASIA PACIFIC



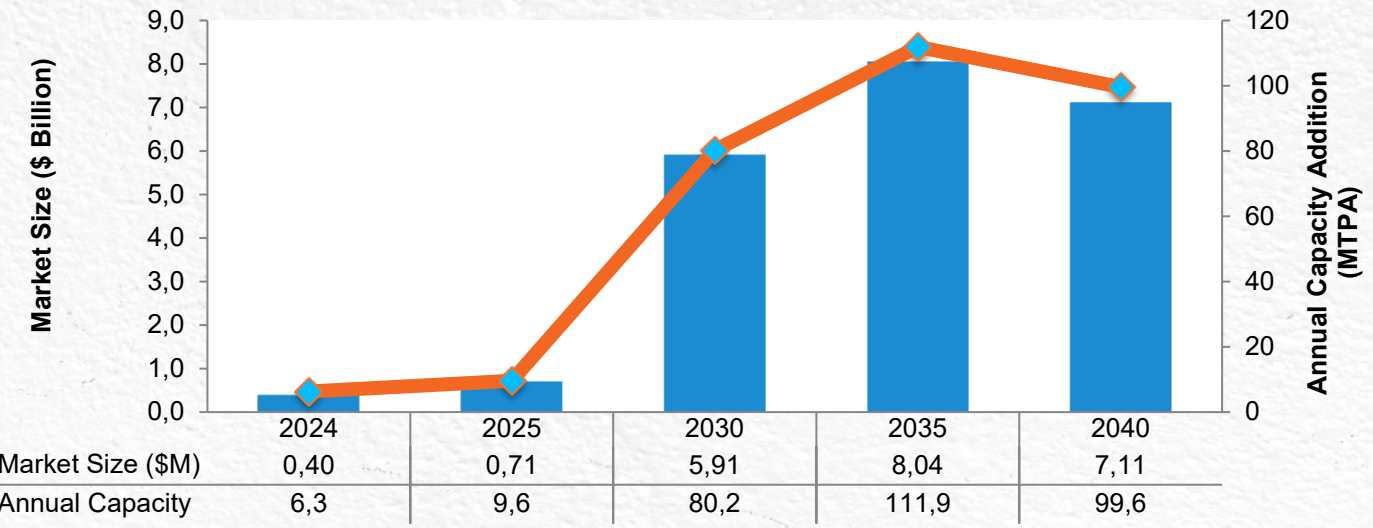

## $CO_2$ CAPTURE

$CO_2$
23.2 Mtpa

The 34 commercial operational facilities have a combined total capture capacity of 23.2 Mtpa. Most of these projects are Fertilizer and chemical, Hydrogen Production, NG processing, Coal PC CCS.

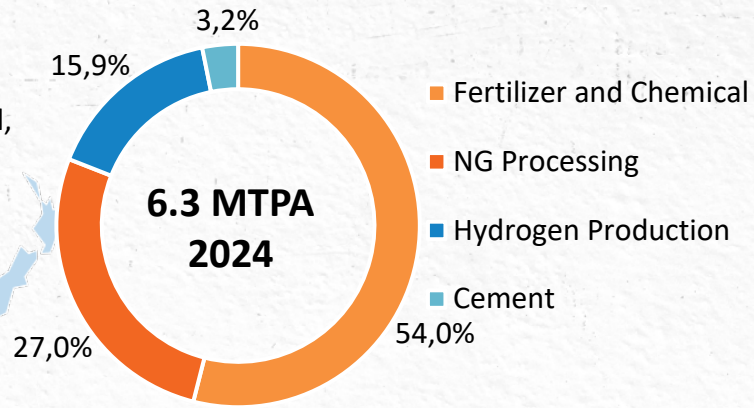
- CCUS in Asia Pacific is gaining momentum due to net-zero targets, industrial cluster decarbonization, vast storage potential, regional $CO_2$ hubs, and growing investment from both governments and major private players.
- Asia Pacific faces major hurdles due to weak regulatory frameworks, insufficient financial incentives, infrastructure and technical gaps, and limited public and regional coordination, despite growing interest and potential.

**CCUS: Carbon Capture Market Size and Annual Capacity Addition Forecast, Asia Pacific, 2024-2040**

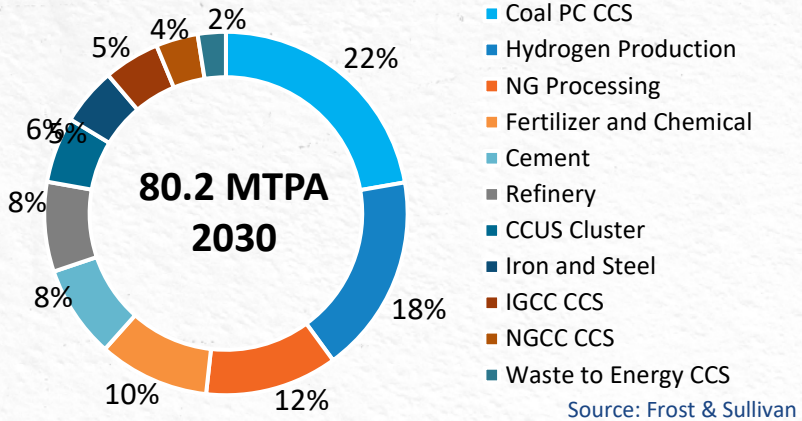



| | 2024 | 2025 | 2030 | 2035 | 2040 |
|---|---|---|---|---|---|
| Market Size ($M) | 0,40 | 0,71 | 5,91 | 8,04 | 7,11 |
| Annual Capacity | 6,3 | 9,6 | 80,2 | 111,9 | 99,6 |

**CCUS: Annual Capacity Share, By Industries, Asia Pacific, 2024**

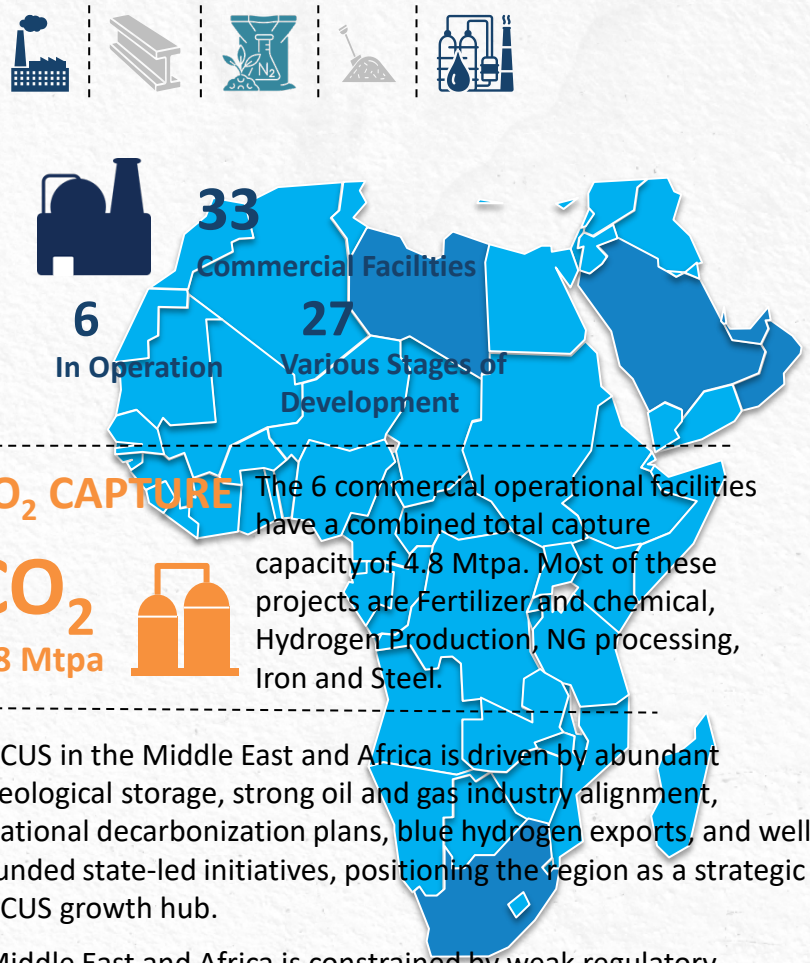



**CCUS: Annual Capacity Share, By Industries, Asia Pacific, 2030**




Source: Frost & Sullivan

# CARBON CAPTURE, UTILIZATION AND STORAGE REGIONAL TRENDS AND ANALYSIS – MEA



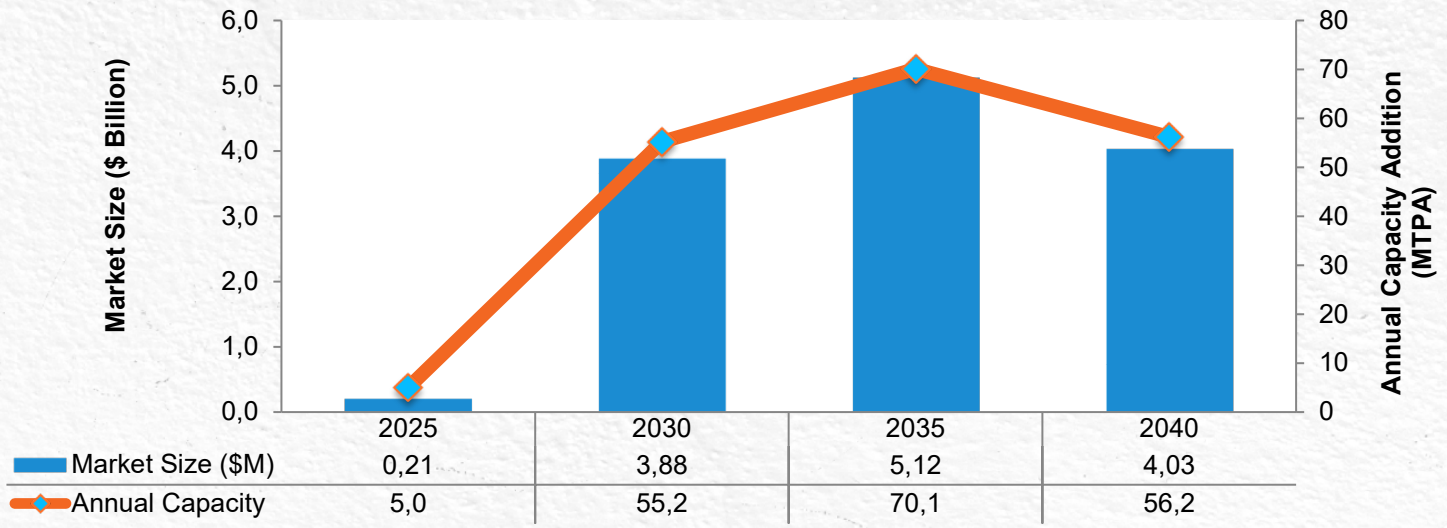

**$CO_2$ CAPTURE**

**$CO_2$**
**4.8 Mtpa**

The 6 commercial operational facilities have a combined total capture capacity of 4.8 Mtpa. Most of these projects are Fertilizer and chemical, Hydrogen Production, NG processing, Iron and Steel.

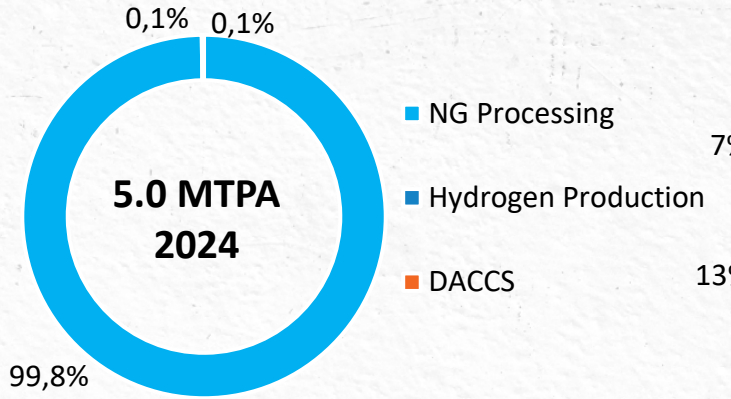
- CCUS in the Middle East and Africa is driven by abundant geological storage, strong oil and gas industry alignment, national decarbonization plans, blue hydrogen exports, and well-funded state-led initiatives, positioning the region as a strategic CCUS growth hub.
- Middle East and Africa is constrained by weak regulatory frameworks, limited carbon pricing, underdeveloped infrastructure, low technical readiness, and competing development priorities, especially in Africa.

**CCUS: Carbon Capture Market Size and Annual Capacity Addition Forecast, MEA, 2024-2030**

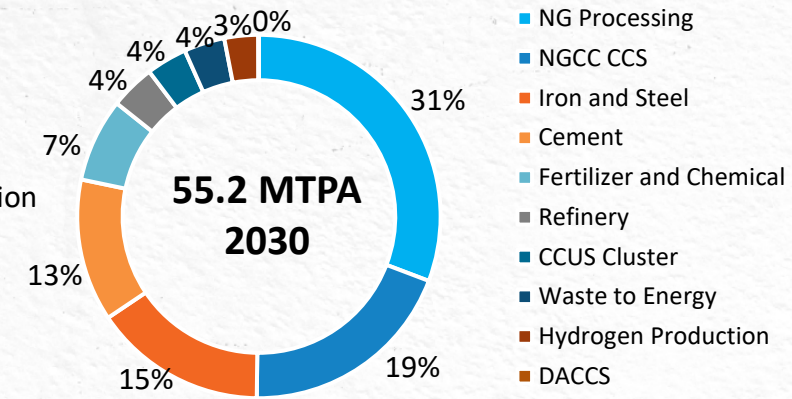



| | 2025 | 2030 | 2035 | 2040 |
|---|---|---|---|---|
| Market Size ($M) | 0,21 | 3,88 | 5,12 | 4,03 |
| Annual Capacity | 5,0 | 55,2 | 70,1 | 56,2 |

**CCUS: Annual Capacity Share, By Industries, MEA, 2024**




**CCUS: Annual Capacity Share, By Industries, MEA, 2030**




Source: Frost & Sullivan

# SEPARATION TECHNOLOGY BENCHMARKING ACROSS VARIOUS INDUSTRY VERTICAL

| Industry | Chemical Absorption | Physical Absorption | Physical Adsorption | Membrane Separation | Cryogenic Separation | Oxy-fuel Combustion | Chemical-looping | Calcium-looping | Others | DAC |
|---|---|---|---|---|---|---|---|---|---|---|
| Coal Fired Power CCS | 🟢 | 🔴 | 🟢 | 🟡 | 🔴 | 🟢 | 🟡 | 🟢 | 🔴 | |
| NGCC CCS | 🟢 | 🟡 | 🟡 | 🟡 | 🟡 | 🟢 | 🟡 | 🟢 | 🔴 | |
| IGCC CCS | 🟢 | 🔴 | 🟡 | 🟡 | 🟡 | 🟢 | 🟡 | 🟢 | 🔴 | |
| Iron and Steel | 🟢 | 🔴 | 🟢 | 🟡 | 🟡 | 🔴 | 🟢 | 🟢 | 🔴 | |
| Cement | 🟢 | 🔴 | 🟢 | 🟡 | 🔴 | 🟢 | 🟢 | 🟢 | 🟢 | |
| Fertilizer and Chemical | 🟢 | 🟢 | 🟢 | 🟡 | 🟢 | 🔴 | 🟢 | 🔴 | 🟢 | |
| Refinery | 🟢 | 🟢 | 🟢 | 🟢 | 🟢 | 🟢 | 🔴 | 🟡 | 🔴 | |
| NG Processing | 🟢 | 🟢 | 🟢 | 🟢 | 🟢 | 🟢 | 🔴 | 🔴 | 🟡 | |
| Hydrogen Production | 🟢 | 🟢 | 🔴 | 🟢 | 🟢 | 🔴 | 🔴 | 🔴 | 🟡 | |
| Bioenergy CCS | 🟢 | 🟢 | 🟢 | 🟢 | 🟢 | 🔴 | 🟡 | 🟢 | 🟡 | |
| Waste to Energy | 🟢 | 🔴 | 🟢 | 🟡 | 🟡 | 🔴 | 🔴 | 🔴 | 🟢 | |

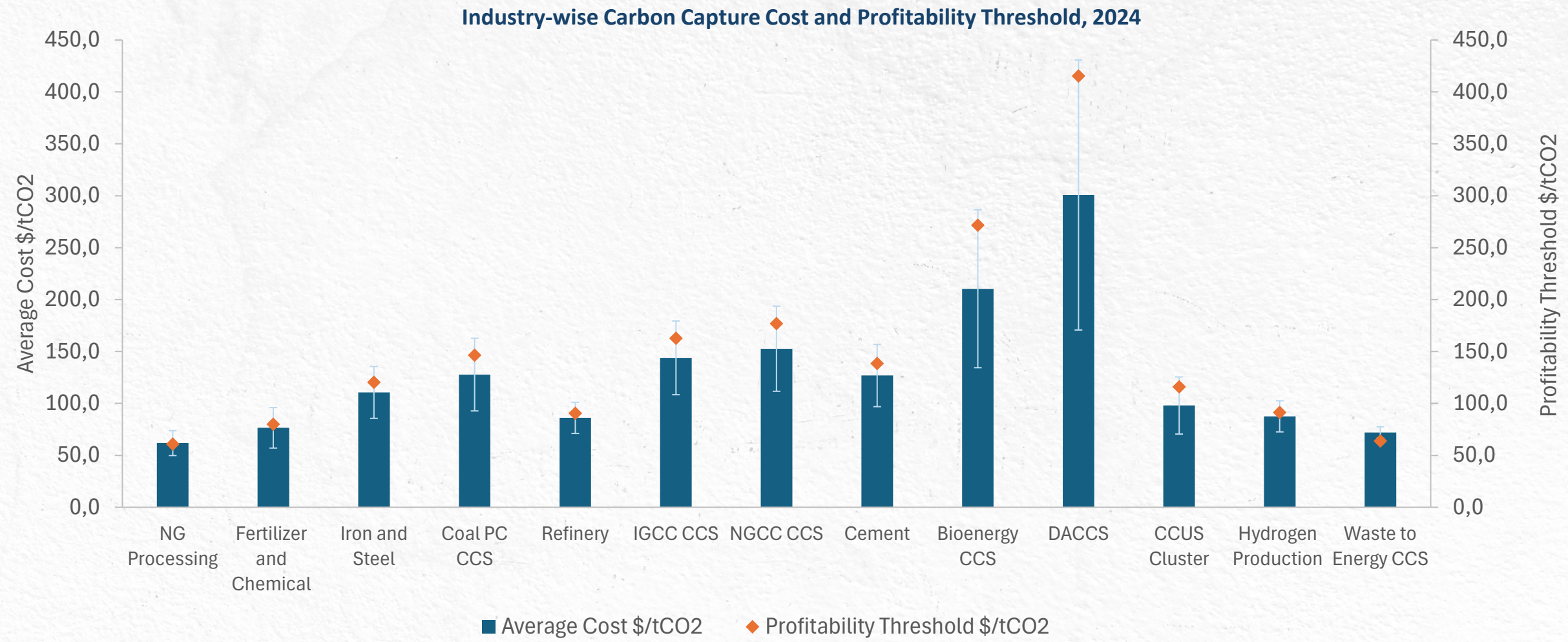
🟢 Commonly Used  🟡 Challenger  🔴 Less Likely Used  ▬ Most likely be added to capture additional CO2 from atmosphere

# COMPARISON OF MAJOR CARBON CAPTURE TECHNOLOGIES

| Technology | Main Mechanism | Operating Conditions | $CO_2$ Purity | Energy Demand | Key Advantages | Limitations |
|---|---|---|---|---|---|---|
| **Chemical Absorption** | **$CO_2$ reacts chemically with liquid amines forming carbamates** | **40–120 °C** | **95–99%** | **High (heat for solvent regeneration)** | **High selectivity, mature tech, continuous operation** | **High energy use, solvent degradation, corrosion** |
| **Physical Absorption** | **$CO_2$ dissolves physically in solvent under pressure** | **<50 °C, high pressure** | **90–99%** | **Moderate** | **Efficient at high pressure, low degradation** | **Ineffective at low pressure, high solvent cost** |
| **Physical Adsorption** | **$CO_2$ adsorbs on porous solids via van der Waals forces** | **Ambient–100 °C** | **85–95%** | **Moderate** | **Low cost, regenerable, scalable** | **Sensitive to moisture, lower selectivity** |
| Cryogenic Separation | $CO_2$ condensed by cooling to low temperatures | −100 °C to −140 °C | 99+% | Very high (refrigeration) | Produces pure $CO_2$, no chemicals needed | High energy cost, complex refrigeration |
| Oxy-Fuel Combustion | Fuel burned in pure $O_2$ → flue gas is mainly $CO_2$ and $H_2O$ | >1,000 °C | 95–99% | High ($O_2$ generation cost) | Simplifies $CO_2$ capture, compatible with existing plants | Oxygen production energy cost |
| Chemical Looping | Metal oxide transfers $O_2$ to fuel; $CO_2$ separated inherently | 800–1,000 °C | 95–99% | Moderate | Inherent $CO_2$ separation, no $N_2$ dilution | Complex reactors, material sintering |
| Calcium Looping | Cyclic CaO ↔ $CaCO_3$ reaction captures $CO_2$ at high T | 600–900 °C | 90–95% | High (calcination step) | Abundant, cheap material | Sorbent degradation, heat management |
| **Membrane Separation** | **$CO_2$ selectively permeates polymeric or inorganic membranes** | **Ambient–200 °C** | **80–95%** | **Moderate** | **Compact, modular, no solvent** | **Selectivity–permeability tradeoff, fouling** |
| Direct Air Capture (DAC) | $CO_2$ captured from air using solid (amine) or liquid (hydroxide) sorbents | Ambient T & P | 95–99% | High (due to dilute $CO_2$) | Negative emissions, flexible siting | High cost, energy intensive |

# CCUS COST VS PROFITABILITY THRESHOLD – BY INDUSTRY

Average costs vary substantially, depending on the end user industry and also new build vs. retrofit. DACCS and bioenergy have the highest profitability threshold meaning that they either need specific incentives or project cost reductions.




Note: Average cost consist of carbon capture, transportation and storage cost

Note: Error bar indicates low cost and high cost

# TRENDS AND RISKS IN CARBON CAPTURE, UTILIZATION, AND STORAGE (CCUS)

## TRENDS

**CCUS Hubs:** Reduced cost and risk

**Integrated Value Chains:** Ultimately connecting capture with end use via clusters

**Policy and Incentives:** Clear regulatory frameworks and incentives pivotal to success

**Public-Private Partnerships:** Governments and private companies are partnering for risk sharing

**Subscription Models:** Carbon capture as a service

## RISKS

**High Costs:** Significant upfront investment required

**Storage Risks:** Uncertainties regarding the long-term storage of CO2

**Transportation Risks:** Transporting CO2, especially in liquid form, requires high-pressure pipelines

**Policy and Incentives:** Potential for changes/deviations/delays

**Market Volatility:** Fluctuations in demand impacts through the value chain

**Supply Chain Disruptions:** Complexity in the supply chain raises the potential for delays

# CCUS COMPANY LANDSCAPE … DIVERSE ECOSYSTEM OF PLAYERS

## Carbon Capture Solutions

AKER CARBON CAPTURE
Linde
AIR PRODUCTS
carbon clean
T.EN TECHNIP ENERGIES
MITSUBISHI HEAVY INDUSTRIES
climeworks
Carbon Engineering
Global Thermostat The Carbon Negative Solution
Svante
Air Liquide
Sumitomo SHI FW
Carbon8
Kiewit
8 RIVERS

## CCUS Digital Solutions

slb
Baker Hughes
AKER CARBON CAPTURE
aspentech
Microsoft
MITSUBISHI HEAVY INDUSTRIES
IBM
Honeywell
COGNITE
SIEMENS
AVEVA
EMERSON
YOKOGAWA
KONGSBERG
accenture
T.EN TECHNIP ENERGIES
ABB
Rockwell Automation

## Utilization & Upcycling

LanzaTech
twelve
CarbiCrete
Carbfix
ECONIC TURNING $CO_2$ INTO ENDLESS POTENTIAL
norsk e-fuel
SOLIDIA
Blue Planet
carbon upcycling
CARBON CURE
CARBON RECYCLING INTERNATIONAL
HAGO ENERGETICS

## Project Developers

bp
TotalEnergies
equinor
ENGIE
RWE
ExxonMobil
Chevron
VATTENFALL
SUEZ
eni
AIRBUS
e·on
aramco
Ørsted
OXY
CNPC
CNOOC
BASF We create chemistry
HEIDELBERGCEMENT
LAFARGE

Source: Frost & Sullivan

## KEY TAKEAWAYS

1. Carbon capture is largest + fastest growing segment across the CCUS value-chain. **Potential ROI between 10% to 20% of project lifecycle possible** - policies and regulations framework across different region will be critical.

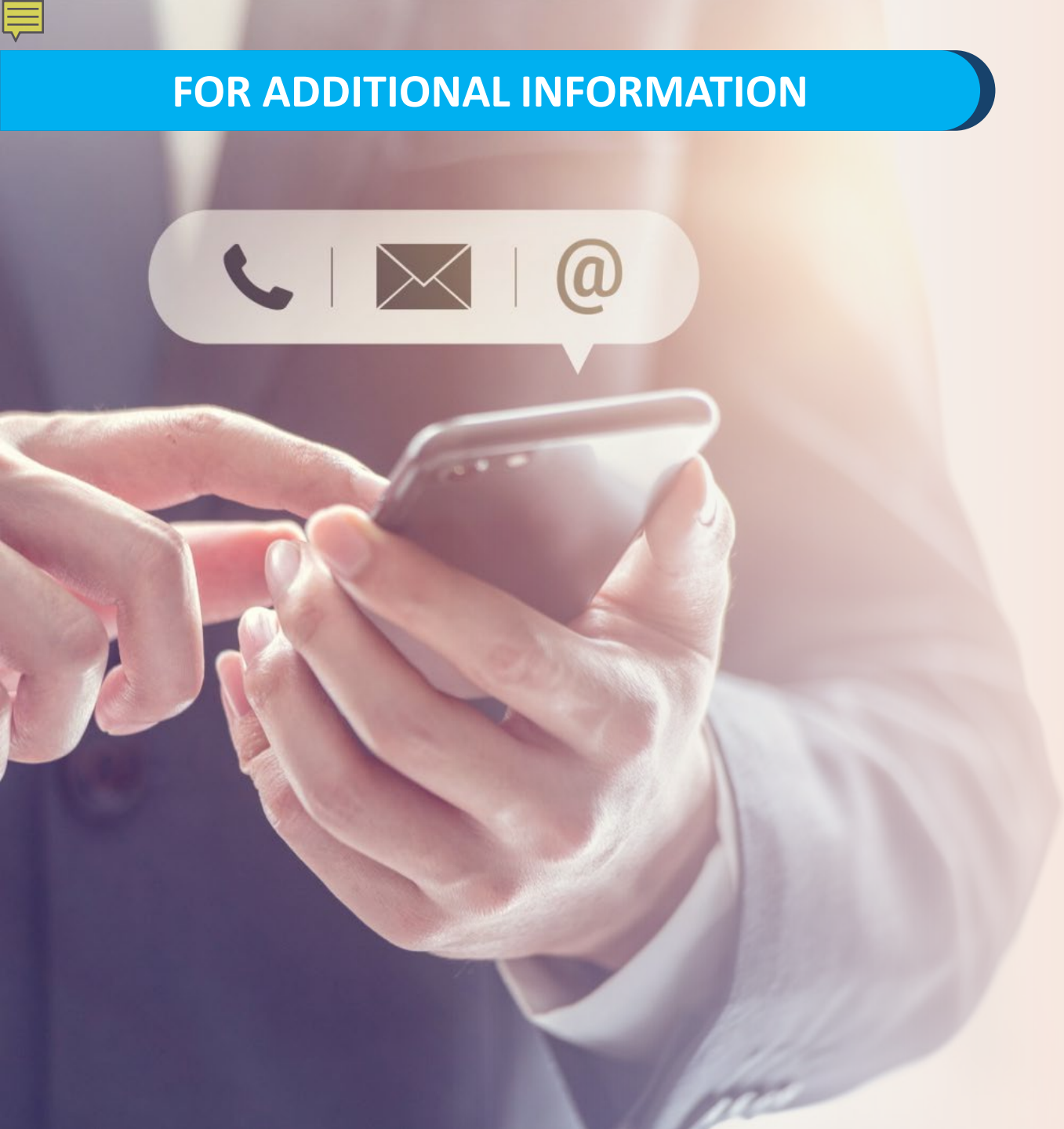
2. In short to mid term, CCUS will find a wider application in hard – to– abate industries such as cement, iron and steel, fertilizers and chemical production by retrofitting the existing plants.

3. Like any other industrial technologies, CCUS is heavily dependent on economies of scale. **Modularization can bring down the cost by building standardized plants and mass production techniques.**

4. Carbon capture is energy intensive, accounting for 25%-30% of OPEX. **90% of industry players believe energy consumption is the one of the biggest challenges in scaling carbon capture projects,** so energy efficiency is key.

5. Converting carbon valuable products such as fuels, chemicals, building materials  can create new revenue streams, making carbon capture more financially attractive.

# FOR ADDITIONAL INFORMATION

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