World Energy Council Türkiye
Select Articles
No 251: 12-19 February 2024

CCUS Key For Energy Security And Clean, Affordable Energy

As both global population and energy use continue to rise, the mission is clear: to provide accessible, reliable and affordable energy while reducing emissions. The eye on the ball is emissions – not merely fuel and energy source substitution. According to studies by the International Energy Agency (IEA), CCUS – carbon capture, utilization and storage – is an essential technology for achieving this goal.

The energy trilemma of access, reliability – plus being affordable – *and* being environmentally responsible is the critical needle to thread during the energy transition. To strike this balance, most consumers and market segments demanding energy will require fossil fuels for the next 50-plus years, while we accelerate alternate energy paradigms. CCUS is the essential tool for reducing emissions from traditional, hard to decarbonize energy sources. Analyses from the Intergovernmental Panel on Climate Change and the International Energy Agency state that it is impossible to achieve net-zero targets by 2050 without CCUS in the energy mix.

Recent developments across the world have provided a much-needed momentum to accelerate the growth of CCUS. The United States is leading these efforts, with the federal government providing capital and incentives to encourage participation from the industry. Policy changes and permitting challenges however constrain that acceleration.

The year-on-year growth of CCUS projects has exceeded 50% since 2020, according to the Global CCUS Institute. In 2023, the total capacity of all CCUS facilities under development across the globe has grown to over 430 million

tons of CO_2 per annum. This accelerating CCUS investment illustrates a move from ambition to action for addressing climate change.

This growth is largely driven by the private sector, and it is supported by an evolving regulatory landscape which is increasingly making the business case for CCUS more viable. Moreover, there are over 160 Class VI permit applications (necessary for CO_2 storage injection) submitted and awaiting ruling at the U.S. Environmental Protection Agency (EPA).

CCUS penetration for broad commercialization must grow 120-fold by 2050 to meet aspirational net-zero commitments according to McKinsey & Co. To achieve these goals, policy involvement is critical. Before the Inflation Reduction Act (IRA) was passed in the U.S., only 12 out of 26 CCUS projects were economically viable according to S&P global. The IRA accelerates CCUS deployment and includes enhancements to the 45Q tax credit. The recent Infrastructure Investment and Jobs Act complements the IRA by providing over $12 billion for CCUS including $2.5 billion for carbon storage validation, $8 billion for hydrogen hubs and over $200 million announced or awarded by the U.S. Department of Energy for CCUS technology development. Canada also established a C$2.6 billion tax credit for CCUS projects, and in Europe, four out of seven projects initially funded by the European Union's Innovation Fund were CCUS projects — Denmark alone recently announced €5 billion in CCUS subsidies.

Despite the government support, the infusion of cash from the operators is critical. In North America, recent developments include new projects and a significant infusion of developmental capital. Last year, ExxonMobilXOM +2.9% acquired *Denbury* Inc. expanding opportunities to economically reduce carbon dioxide (CO_2) emissions across 1,500 miles of the largest U.S. network of CO_2 pipelines, and 15 onshore sites with a potential to reduce CO_2 emissions by greater than 100 million metric tons a year. Quest CCUS project developed by *Shell* as a part of the Athabasca Oil Sands *Project* (AOSP) in *Alberta*, *Canada*, presents the world's first commercial-scale CCUS project for an oil sands operation, and it has captured 7.7 million tons of CO_2 (based on the data from September 2022).

The Petra Nova project was completed and implemented at the Parish coal-fired power plant in Texas in 2017 as the world's largest post-combustion CO_2 capture and compression system. It is the only CCUS project affixed to a power plant in the United States, designed to capture approximately 90% of CO_2 from 240 MW slipstream of flue gas and use or sequester approximately 1.4 million metric tons of this greenhouse gas per year. JX Nippon Oil recently acquired the project to ramp up further investment in CCUS technology and reduce CO_2 emissions. This is a perfect example of foreign investment to gain further experience and know-how with an eye toward global expansion of CCUS projects.

Another example is the Bayou Bend underground storage project expected to enable storage of CO_2 from petrochemical facilities in Port Arthur to geologic repositories some 8,000 feet below 40,000 acres of offshore space in the Gulf of Mexico in the U.S. The plan is to expand the storage area to 100,000 acres onshore. Large-scale storage, such as this, is essential not only for economics but also to ensure the broad-based measurement, monitoring and verification and accounting (MMVA) of CO_2 that is safely and permanently stored.

In spite of the investment ramp up, regulatory and capital challenges remain, and the business landscape has risk that is often not prescribed. The permit application documentation for the Bayou Bend project totaled 5,000 pages, with an additional 10,000 pages of supporting material. Despite this extensive documentation, unforeseen questions persist, making the permit application process challenging. Additionally, CCUS projects also face public resistance due to perception challenges indicating that businesses and policy makers have failed to effectively communicate the necessity and benefits of CCUS technologies for economic growth in regions.

As a global technology leader, we are committed to assisting other countries with developing and deploying CCUS technologies to accelerate their energy transition based on their unique needs.The world cannot solve CO_2 emissions with a singular focus on Europe and North America. The global deployment of CCUS technology is crucial in countries heavily reliant on fossils fuels and experiencing economic and population growth — this is where the impact must occur to make meaningful progress toward a net-zero future.

In upcoming posts, we will discuss how CCUS impacts the energy transition across sectors like electricity, chemicals, fuels and manufacturing. We will also explore how public perceptions of CCUS vary across different demographics and affected areas and examine competitive alternatives. There is no one solution and CCUS is not right everywhere or for everyone – but it must be considered as without its broad deployment we cannot effectively achieve a sustainable energy transition.

Source: Forbes